

THE IRON AGE

New York, October 3, 1918

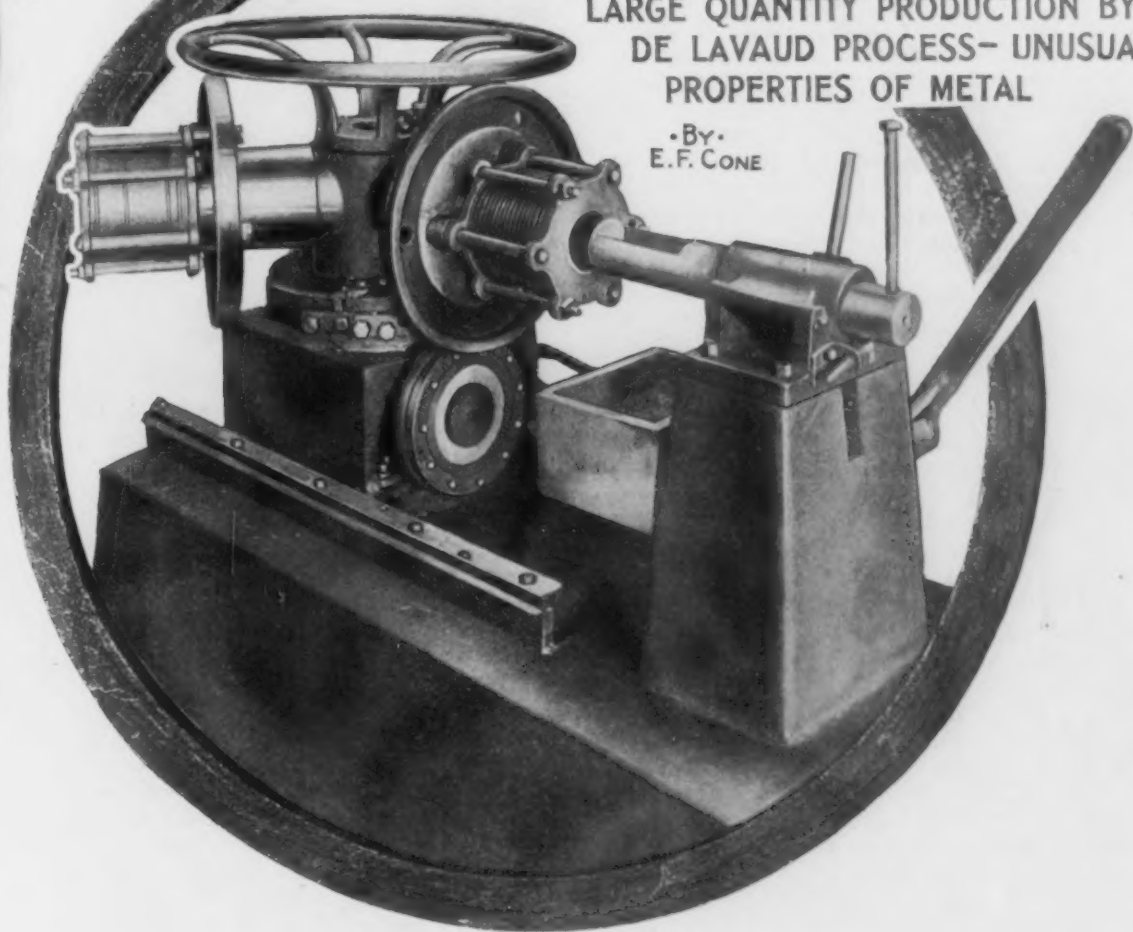
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CASTING RINGS IN CENTRIFUGAL MACHINE

LARGE QUANTITY PRODUCTION BY
DE LAVAUD PROCESS—UNUSUAL
PROPERTIES OF METAL

•BY•
E. F. CONE



ESTIMATES of the number of iron piston rings consumed in the United States each year run up to about 200,000,000. Most of these are incorporated in automobile and many in airplane engines, but large numbers are used in steam, marine and other engines and in pumps. The Ford interests alone probably use in normal times about 16,000,000 each year.

The making of these rings bids fair to be revolutionized, if it has not been already. A new process has been invented and is now operating on a commercial scale in Newark, N. J., by which rings are being made in a remarkably brief operation and of exceptional quality. It is known as the De Lavaud process and by its use it is possible to make from 18,000 to 20,000 piston rings per unit each day of 8 to 10 hours. The rings are cast centrifugally from hot metal in a special machine.

The usual practice of making piston rings con-

sists in casting them in sand molds made by molding machines or by cutting them singly from a ring of solid cast metal, but the latter method is no longer extensively used. While the molding machine and sand casting have been considered fairly proficient as to quantity production, the capacity of a molding machine is put at about 420 piston rings a day.

The new process is a further development of the making of cast-iron pipe centrifugally, as described in *THE IRON AGE*, Sept. 7, 1916. The inventor of that process, D. Sensaud de Lavaud, a Brazilian, is also the inventor of the new piston ring machine. The making of cast-iron pipe centrifugally is now a commercial success in France and in Canada and as soon as the war permits a company will be operating in the United States.

After all the patents had been granted and the details of the piston ring process worked out, a

manufacturing company was formed known as the Standard Piston Ring Co., Newark, N. J. James Flockhart of Maher & Flockhart, is the president, and Mr. De Lavaud, the vice-president of the new company. Across from the large Newark iron foundry of Maher & Flockhart the Standard Piston Ring Co. is operating its small plant, which occupies at present portions of the buildings of another plant that once existed on that site. To make 18,000 to 20,000 rings a day only about 11 men and boys are now necessary, operating one unit to handle the product, the whole operation being conducted in about 400 sq. ft. of space.

How the Rings Are Formed

The process of manufacture of the centrifugally cast ring is simple. It consists in introducing into a rapidly revolving permanent metal mold a definite amount of hot metal of proper composition, which is immediately thrown to the outer surface of the revolving mold. There it quickly cools and assumes its definite shape. After that the ring is removed and annealed. Next, the inner rim of the ring is ground on a special machine. The finished product is then so nearly ready for use that very little machining is necessary. Of course, no cleaning or removal of fins, excess metal or sand is called for. The uniformity of the rings as to size and thickness of section is an important claim.

The Casting Machine

The machine in which the rings are cast is shown in illustrations. The one introducing this article represents the casting machine as it appears ready for use. Encircling it is an enlarged view of one of the rings as made. The machine consists of three arms protruding from a central standard which can be revolved. On each arm is placed the permanent mold in which the rings are cast. This is a series of alternating rings of cast iron and of thin boiler plate, separating the rings, these forming a series of grooves, the size and thickness of the piston ring to be made. By varying these any diameter ring can be made from 1½ in. up to 8 in. in this machine. By enlarging the machine, rings 30 to 40 in. in diameter can be made, says the inventor. These alternating pieces of metal are held together by an ingeniously arranged set of bolts and pins. A revolving wheel, operating by electricity at the bottom of one side of the central standard, is the motive power which causes the axle carrying the mold to assume its rapid motion. This has a momentum of 1200 r.p.m. when the ring is being cast.

A movement of the larger hand lever shown quickly brings the revolving mold over the small trough in which the hot metal is poured. These troughs are replaceable any moment and are lined with a refractory. A rapid inversion of this trough while inside the revolving mold, empties the metal into the grooves, thus forming the rings. A slight further movement of the lever brings the revolving mold against a brake which stops the revolution. A reversal of the lever brings the mold back against the central standard. A turn of the machine carries the mold with its rings to the right and brings a new mold ready for a new charge of metal.

The molds are transferred to the four arms of the pedestal situated to one side of the casting machine. This is seen in the illustration at the center of the group of three views. Here a crew of boys remove the bolts, at the same time allowing the rings to fall into baskets. The disassem-

bled molds are kept intact loosely and placed on the arms of a revolving wheel by means of which they are made to pass through a tank of cooling liquid. A new machine has nearly been completed for performing the disassembling automatically by electricity, thus doing away with several employees.

Reassembling Machine for the Molds

An ingenious machine has been perfected by Mr. De Lavaud for assembling the molds. As the loosely collected rings emerge from the cooling tank, they are placed in a double acting pneumatic machine shown in one illustration. The movement of a lever forces into the required compressed shape the various discs and holds them while they are being bolted together. In the meantime at the other end of the machine another set of discs is being placed in the machine ready to be forced into shape as the first one is being removed and put on an arm of the casting machine. In this way the process is a continuous one, the casting, the disassembling, the cooling and the reassembling steps following in rapid succession.

Making the Metal

At present the metal is being made in a small cupola, one of the smallest that has ever been commercially operated. It is a 15-in. cupola having a capacity of about 1500 to 2000 lb. to a charge. Here the required proportions of foundry iron, charcoal iron, coal or coke and some scrap are charged and the metal tapped as needed. It has been possible to produce a very high grade iron well suited to the purpose.

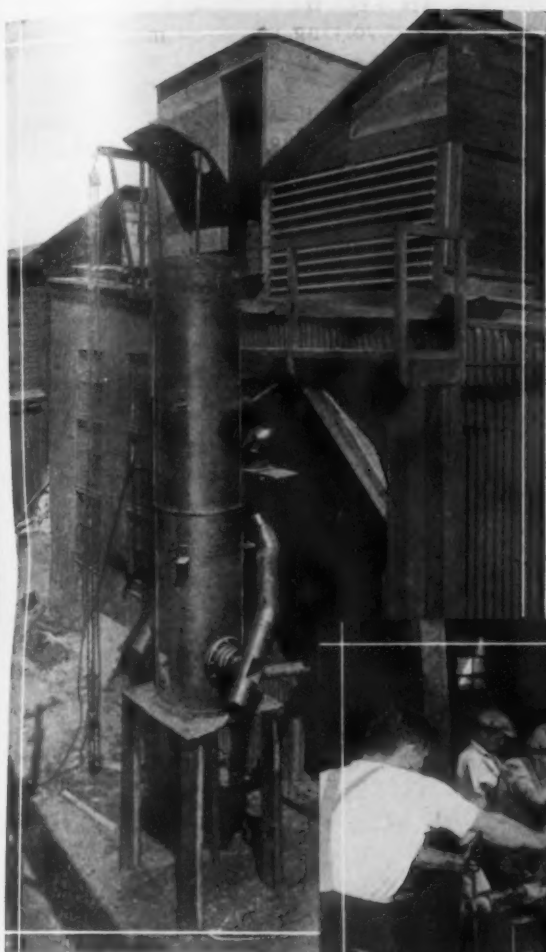
It had been planned to tap the hot iron from the cupola into a small air furnace where it would have been kept hot and used as needed, but this idea was abandoned. It has practically been decided to melt the charges in small acid-lined electric furnaces, thus insuring a constant flow of easily regulated metal as to temperature and composition. Probably 200-lb. furnaces will be used, enabling the melting of the charge in less than an hour and the pouring in about one-half hour.

Annealing the Rings

A unique apparatus has been devised for annealing the rings. As they come from the casting machine they are naturally hard and brittle. The annealing device is shown by an illustration. It consists of a cylinder confined or suspended perpendicularly within a large iron chamber. At a certain section it is heated to the required temperature by means of an oil burner extending inside the outer casing and playing on the cylinder, the degree of heat of the rings for annealing being regulated by a pyrometer. The diameter of the pipe is about that of the rings to be annealed, thus keeping the rings to their exact shape.

The heat treatment is nearly automatic. The rings are fed in at the top and as they pass down they reach the proper temperature of 1900 deg. Fahr. and finally pass out at the bottom properly annealed. It is stated that this device will treat 20 rings a minute or about 1200 an hour.

While the product of this process is virtually ready to use when annealed, it is sometimes desirable to grind the inside of the rings. A special machine for this purpose has been perfected by Mr. De Lavaud which is double acting. A group of about 20 rings can be assembled in one section of this machine as shown, and while they are being ground another group is being assembled for grinding in the other portion of the machine,



The Cupola Now Being Used to Make the Iron Is one of the Smallest Ever operated. It is located just outside the building in which the casting and other machine operate.

The Operation of Casting, Disassembling the Molds and the Reassembling is the Central Illustration. One operator places the mold on the casting machine in the foreground, having taken it from the assembling machine just back of him. Another is pouring metal into the trough preparatory to the man operating the levers and controlling the casting. Other operators disassemble the molds on the four-arm standard at the right.

The Annealing Apparatus Is Operated by One Man, the Rings Going in at the Top and Coming Out at the Bottom Annealed. A pyrometer controls this oil-fired apparatus which turns out about 1200 rings per hour.

the grinding wheel being brought into action on either side by means of a lever. The machine is motor driven.

Properties of the Metal

One of the most difficult irons to produce is a satisfactory one for automobile cylinder packing rings or piston rings, and probably more experimenting has been done in the production of such iron than in that of any other casting. The rings are very light and require a certain amount of springiness difficult to obtain in finished cast iron. Various mixtures have been tried and vanadium has been incorporated in some of them.

Dr. Richard Moldenke, in his "Principles of the Iron Foundry," in discussing piston rings, says:

Springiness is necessary here; the rings should be just a little softer than the cylinders they run in, and hence the combined carbon must be held down somewhat, or a little more silicon used. This springiness can also be obtained by raising the phosphorus, but

this is apt to run the brittleness up unduly. The following analyses will cover the situation:

	Light, Per Cent	Medium, Per Cent
Silicon	2.00	1.75
Manganese	0.70	0.80
Sulphur	0.05	0.06
Phosphorus	0.60	0.50
Total carbon	3.50	3.25

A cylinder is supposed to remain as nearly constant in diameter as when first bored. Any wear should be taken up by the piston rings. Hence a close-grained cast iron, as hard as possible with due regard to machining, is used for the cylinder, and a comparatively softer iron for the rings. Nevertheless this latter should have enough combined carbon to render them elastic.

A German authority, discussing iron castings to be used in the manufacture of piston rings, testifies in *Stahl und Eisen*, Sept. 4, 1913, that he had succeeded in discovering a material which seems to be better for the stated purpose:

Through repeated melting of the pig, which may contain phosphorus up to 1 per cent, the sulphur



content is increased and the contents of silicon decreased. The process is better defined by studying the analyses of the three meltings:

	First Melting, Per Cent	Second Melting, Per Cent	Third Melting, Per Cent
Free carbon	3.18	2.75	2.49
Combined carbon	0.31	0.42	0.61
Silicon	2.79	2.25	1.53
Manganese	1.26	0.71	0.63
Phosphorus	0.37	0.36	0.34
Sulphur	0.04	0.06	0.079

The metallographic test shows the presence of gray and white pig iron, and in this composition the writer sees the advantage for the manufacture of piston rings.

Tests at Columbia University

Realizing the desirability of knowing the exact properties of the metal in the rings cast by the new process, the inventor had rings from the same

cast rings were in the annealed condition.

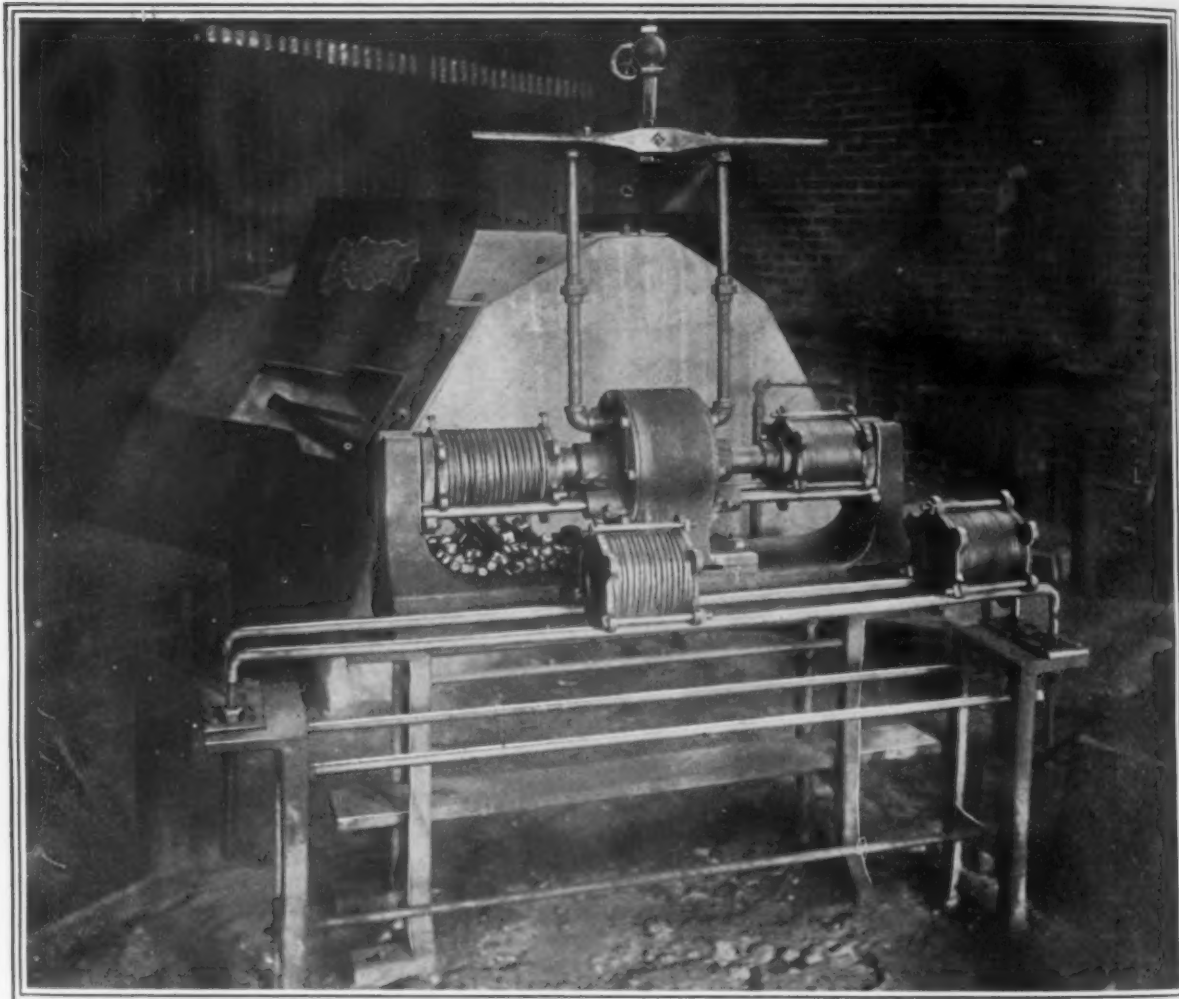
The chemical analysis, made by the department of chemistry of Columbia, resulted as follows:

	Machine Cast, Per Cent	Sand Cast, Per Cent
Total carbon	3.292	3.272
Silicon	2.065	2.063
Sulphur	0.061	0.051
Manganese	0.437	0.412
Phosphorus	0.772	0.752

This shows practically no difference between the two rings and that is natural. There is, however, a decided difference in the physical properties which can be accounted for only by the process of manufacture.

The Elasticity of the Metal

The modulus of elasticity was determined by subjecting the various rings to compression, the



The Assembling Machine Specially Designed for Reassembling the Molds. It is double-acting. Some of the assembled molds are visible on the rack and ready to be passed on to the casting machine. The cooling tank is just back of the machine

cupola charge cast in the centrifugal machine and others cast in sand molds, the practice in the latter case being the same as used generally to-day. Some of each set were submitted to the testing laboratories of Columbia University, New York. The results are extremely interesting and were even beyond the expectations of those concerned.

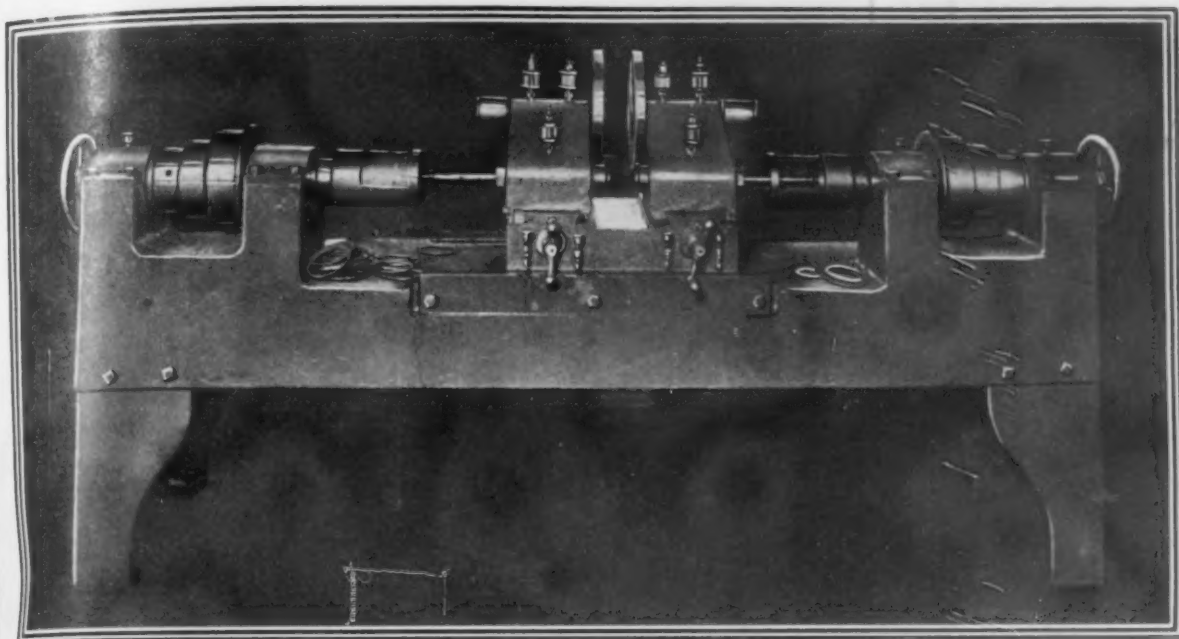
The report on these tests is a detailed one and therefore only a brief resumé is possible. Specimens from each kind of ring, the machine cast and the sand cast, were subjected to tests to determine the following properties: Modulus of elasticity; hardness, including uniformity of hardness; tensile strength; machinability, chemical analysis and micrographic analysis. The machine-

loads being applied to diametrically opposite points and the deflections noted. These show that all of the rings made by the new process are much stronger than those made from the ordinary sand casting. This is further verified by the tension tests made on the small specimens cut from the body of the rings. The following table shows this relation very closely:

	Ultimate Load in Compression		Tensile Strength	
	Lb.	Per Cent	Lb. per Sq. In.	Per Cent
Machine cast	155	136	61,400	128
Sand cast	114	100	47,740	100*

*Percentage computed on basis of the sand-cast ring as standard; that is, taken at 100 per cent.

The report calls attention to the unusually high values obtained for the tensile strength:



The Double-Acting Machine Designed for Grinding the Inside of 20 Rings at a Time. It is motor-driven.

These high values can only be attributed to the high grade quality of the material and the very small size of the specimens. It is generally recognized that in testing cast iron in tension, the strength increases rapidly with the smaller specimens. Furthermore we took the precaution to calibrate the testing machine and checked the tensile strength against the modulus of rupture as obtained from the compression tests.

Although the coefficient of elasticity is practically the same for all of the rings tested, namely, 21,000,000 lb. per sq. in., there is nevertheless a decided difference in the elastic behavior of the two types of rings. The rings manufactured by the method of the Standard Piston Ring Co., from this standpoint, are vastly superior to the rings made from the ordinary sand casting.

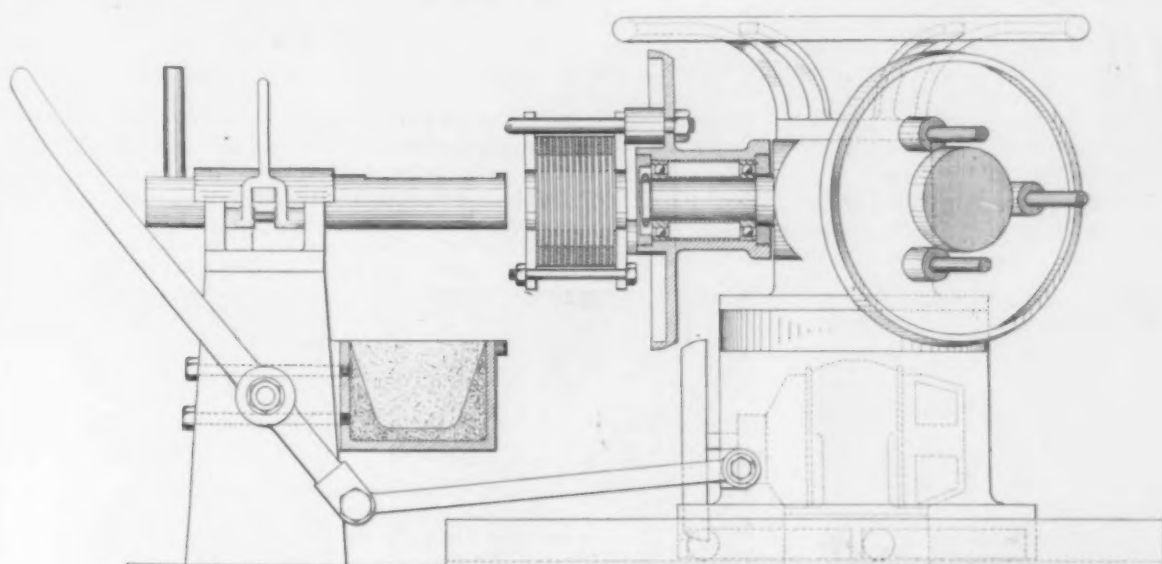
The ultimate resilience or work done in breaking the rings is given in the following table:

Type of Ring	Ultimate Resilience in Compression	
	Inch-Pounds	Relative Percentages
Machine cast	19.28	310
Sand cast	6.21	100

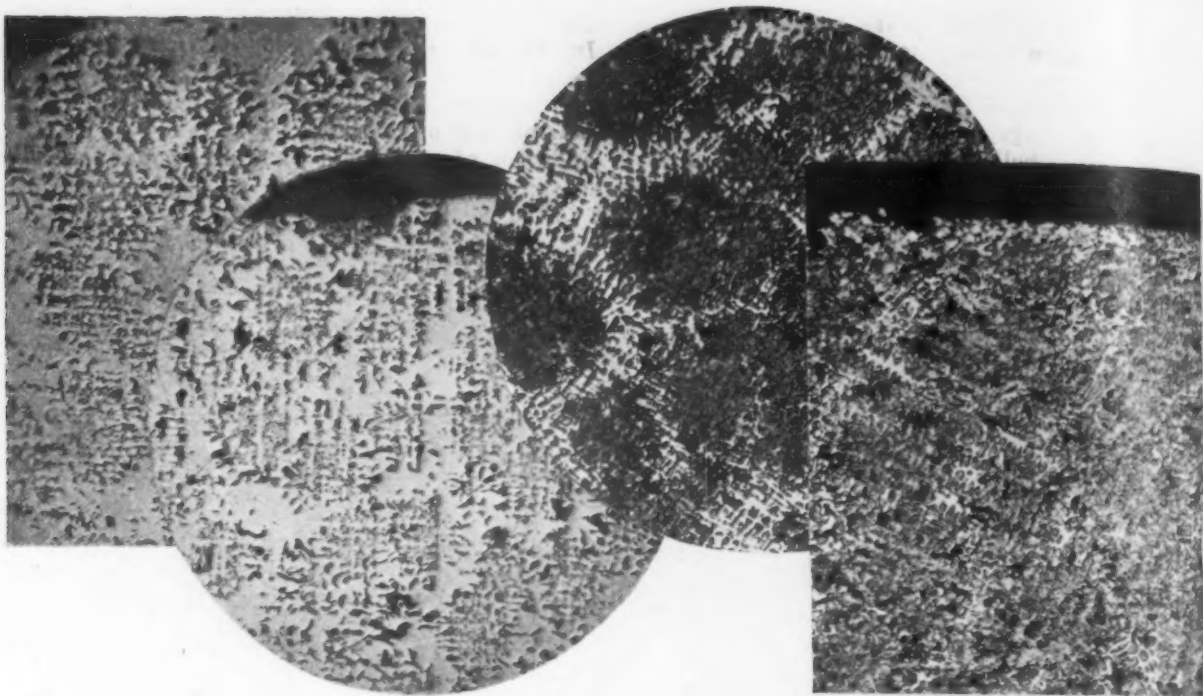
Note.—Sand-cast ring assumed to be 100 per cent.

The above results indicate that it takes about three times the energy to break the rings made by the method of the Standard Piston Ring Co. than to break the rings cast in sand molds.

Although the modulus of elasticity is the same for all of the rings, the sand-cast rings possess no true



A Cross-Section of the De Lavaud Centrifugal Casting Machine, Showing the Mechanism and the Parts. The inside of the mold is visible in section as well as the motor which propels the wheel which causes the part carrying the mold to attain a speed of 1200 revolutions per minute. The trough is shown as well as a receptacle below in which any spilled metal is caught. A feature of this is that it is stationary and does not move longitudinally but only around or on its axis. Movement of the large lever forces the mold to its position over the trough and back again.



Photomicrographs of Sand Cast Iron Piston Rings. The one at the extreme left shows the structure from the outside to nearly the center, as polished. The next, the circle, shows the structure from the inside surface to almost the center, as polished. The second circle shows the structure at the outside after etching in picric acid and alcohol and corresponds with the first photomicrograph. The one at the extreme right shows the structure after etching of the surface as shown by the second photomicrograph from the left. The amount of carbide eutectic is considerably less than in the other etched specimen. All photomicrographs are 90 diameters

elastic limit, whereas the machine-cast rings have a very pronounced elastic limit well below the ultimate strength. The more pronounced and well defined the elastic limit is in a material the more homogeneous and uniform is its composition and structure.

The variation in structure of the sand-cast ring is indicated clearly by the hardness tests made on the various rings. The variation in hardness of the sand-cast ring is one-third greater than the variation in hardness of the rings made by the method of the Standard Piston Ring Co. Furthermore, the average Brinell hardness of machine-cast rings is 177, whereas that of the sand-cast ring is 241, practically a 36 per cent increase.

A careful examination of the log sheets of the hardness tests shows, that in the case of the sand-cast ring, the points of maximum and minimum hardness are found on diametrically opposite sides of the ring, and that the hardness varies gradually between these points, which would tend to a more uneven wear than would otherwise be the case.

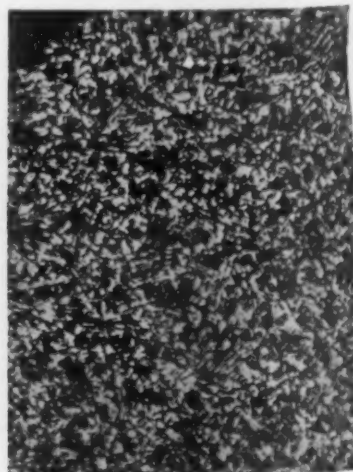
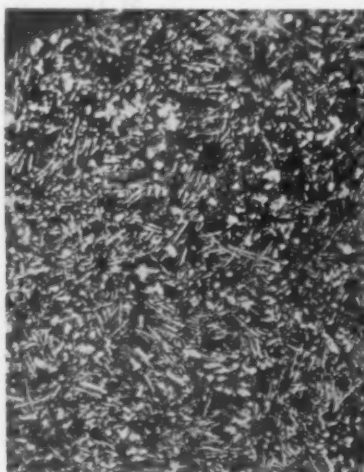
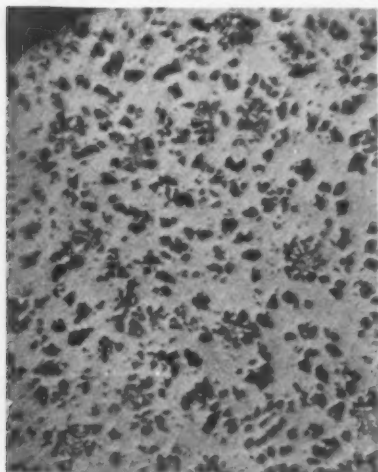
To determine the relative machineability, the two types of rings were subjected to a drilling

test. Test holes were drilled through respective rings with a No. 38 steel twist drill by a standard electric driven machinist's drill. A constant and uniform pressure was maintained at all times upon the drill as it was fed through the hole and the speed of rotation for all specimens was the same.

The time required to drill through the respective rings, all of which were of the same thickness, was 18 sec. for the machine-cast rings and from 21 sec. to 2 min. and 57 sec. for the sand cast. In the latter case the maximum time was at a point on the opposite side of the ring to that where the minimum time was consumed.

Micrographic Examination

The remarkable and uniform properties which the De Lavaud process rings possess are due to the density and structure of the metal. Micrographic examination shows the graphite to be distributed in a much finer condition than in the



Photomicrographs of Machine Cast Piston Rings. The one at the left shows the structure at the center of a ring; the center one shows the same after etching in picric acid and alcohol, the rods of carbide and the granules of silico-ferrite being surrounded by pearlite; the third one (right) shows the center of the second sample in which there is an increase in the amount of silico-ferrite and a decrease in the amount of carbide plates

sand cast and also the entire crystalline formation to be more homogeneous and finer than is possible by any slow-cooling process.

Reproductions of the photomicrographs of the two types of rings, taken and commented on by Professor Campbell of Columbia, are given on this page. The group of four represent the structure of the sand-cast rings, both on the outside and inside up to nearly the center and polished and also etched. The graphite occurs in very fine plates and dots, and the structure is distinctly dendritic. On etching, the matrix consists of pearlite which surrounds the graphite. Around the grains of pearlite a distinct network of carbide eutectic occurs, which is much heavier on the outside than on the inside of the ring. Details of photomicrographs are given in captions.

In the group of three photomicrographs, which represent the machine-cast rings, the one at the

left is the unetched and the other two the etched. In the polished section the graphite shows up as small nests or aggregates and chunky particles. In the etched sections the matrix consists of globular patches of silico-ferrite, more or less pearlite, and rods of carbide in variable amount. Details of the photomicrographs are given in the captions.

Annealed rings when dropped to the floor rebound with a decided springiness. The superiority in strength is due to the crystalline structure. The striking feature of uniformity in hardness at any point in the surface is explained by the fact that in forming sand-cast rings the metal flows to one portion of the mold and cools there first quickly while the remaining portions are retarded in cooling.

The company is now completing an order of 4½-in. rings for the Government to be used in Liberty motors.

Suggestions on Mixing Foundry Core Sand

Analysis of Method for Securing Best Porosity and Strength in Cores

—DR. ROBERT GRIMSHAW*

THE sand used for core making must, to yield highly satisfactory results, possess four qualities which in some respects antagonize each other in so far that no core made with either natural or mixed sand can possess any one of them in 100 per cent efficiency. These qualities are (1) infusibility, (2) porosity, (3) firmness, (4) ease of shaking out.

Bonds

To attain the first two qualities in greater degree, many natural sands must be helped out by clay or by organic bonds. The latter of these, while holding the silica together more firmly than the natural alumina, before baking, practically disappear during that process; leaving the mass porous as well as firmer than ever, while at the same time, if fibrous, they facilitate shaking out. The addition of clay bond to sand which is weak in alumina is all right enough, but makes the core so hard that it is difficult to remove. Porosity is more necessary for cores than for molds, for the simple reason that while the mold sand has molten metal on only one side of it, the cores are entirely surrounded thereby.

Porosity

Now the porosity may be increased otherwise than by the addition of bonds; that is, the action of the bond may be supplemented by a very simple process, which, if it is adopted by the average foundry, I have failed either to see or to hear thereof. It is exactly the reverse of the procedure which I have for the last ten years or so been trying to bang into those who use Portland and similar cements, with what they are pleased to call "aggregates."

Cement concrete, like sand cores, consists of comparatively small solid particles which otherwise would not make a firm mass holding its shape under pressure, held together by a bond. As cement is worth more per unit of volume than, say sand and stone spalls, there is economy in using as little cement as possible. A very good mix is 1:2:3—one volume of cement to two of spalls and three of sand; both the sand particles and the spalls being coated with cement, and the spaces among them filled therewith. If spalls alone were used as an aggregate, more cement would be necessary to fill the spaces—and cement is an expensive filler.

So to make a mix of equal crushing strength with comparatively less cement, more than two different sizes of aggregate are desirable. To attain the highest pos-

sible proportion of aggregates of say three different sizes—say, broken stone, spalls and sand—fill a box or barrel of known content with the stone, then jolt in all the spalls that the interstices will hold, measure them as they are used; and lastly jolt in all the sand (measuring it as it is used) that the remaining interstices will take in. It will then be found that it takes much less cement to bind all together, than where this process was not carried out. The object is to obtain a maximum weight of concrete per unit of volume, with minimum porosity and cement consumption.

Controlling the Core Mixture

Now apply this to the core mixture. The problem is just the reverse of that with concrete; namely, to obtain with the requisite degree of firmness, maximum porosity.

What is the solution? To use an "aggregate"—the sand—which shall leave as large interstices as possible among the particles to be bonded. The maximum of interstice can be obtained by only one method—the opposite from that which should be followed in concrete mixing; namely, the use of sand which has been so screened that all the particles in any one batch are of the same size. If a lot of sand consisting of the run of the bank be screened into two lots, of different coarseness, each lot will make more porous cores than the mixed lot would make. All the bond necessary is that required to coat each sand particle so that it will adhere, both before and after baking, to its immediate neighbors.

A writer in a German geological journal quotes Lespineux's estimate that the total available amount of aluminous iron ores to the north and east of Louvain in Belgium is 7,500,000 tons. Much of this is of the nature of bog iron ore. The beds, which are generally thin and fairly level have become partly exhausted. They were used only to a limited extent for smelting. Some of the ores were used for gas purification and for addition to phosphatic manures, as certain of the deposits contained as much as 5 to 6 per cent of phosphorus. Some of the iron ore beds contained up to 40 per cent of iron. These were used in the Deutscher Kaiser and the Gutehoffnung iron works. The more porous qualities of the ore were exported to England and northern France for use in gas works. Ores of this description were found near Beeringen, and they generally contained so much water (30 to 40 per cent) that they could only be handled at certain seasons. The present output is about 120,000 tons annually.

*717 West 177th Street, New York.

American and Foreign Steel Foundries

A British Comparison of French, Belgian and American Steel Castings—Our Molding and Annealing Called Inferior

STEEL foundry practice in the United States, Belgium and France is briefly and interestingly touched on by Ernest F. Lange in an abstract of a paper in the *London Iron and Coal Trades Review* on "The Development of the Manufacture of Steel Castings." It is based on a trip made to various foreign foundries, and was delivered before the Manchester (England) Association of Engineers. Particularly interesting are his impressions of American practice. A portion of the original abstract follows:

In the United States, for instance, Mr. Lange states that he found molding practice bore a great resemblance to that on the Continent, notably to the Belgian. The best pig iron used would be equivalent to a good Cumberland hematite; they had no equivalent of Swedish pig. The castings produced were sound, but rougher than would satisfy the European market, while in the production of special castings, such as locomotive bar frames, a great degree of skill was shown. The specification requirements for steel castings, as in other steel products, were nothing like as severe as in this country, nor was annealing practiced to anything like the same extent as in Europe. The annealing furnace equipment seemed quite inadequate to the output.

The prices of locomotive castings obtained by the makers were distinctly less than those obtained by English makers, and more nearly resembled the Belgian and German. This would explain the absence of finish on such work, the prevalence of green-sand molding and the avoidance of annealing wherever possible. The small steel castings trade was being developed on Belgian and French lines, by the building of small converter plants, the majority of which were according to the system of M. Tropenas. They had no practice of tapping out small quantities out of a small open-hearth furnace.

Molding Practice in America and Europe

American molding practice, as a whole, was distinctly inferior to the best British and European for the following reasons: Less skilled labor; less good molding materials; too great a speed of production, and too little scientific control of the processes of annealing. On the other hand, the equipment of their best and latest steel foundries was at least equal to anything on this side. Their modern steel foundries were well-arranged steel and glass buildings, with ample floor space and excellent crane equipment. The melting furnaces were well designed, with ample length of ports, and with facilities for easy repair of the port backs, and with ample checker chambers. Much attention was paid to the construction of the gas valves, the Forter being one of the favorite types, and a great deal of attention had been paid to improving the construction of gas producers. One of the best of these, the Hughes, was used by the Standard Steel Co.

They had not as good material as cheaply available for acid open-hearth melting as in this country, continued the author, and this is proved by the fact that all American specifications which include the use of acid material for forgings and rolled products have always higher phosphorus and sulphur limits than similar British ones would allow. In all American steel foundries they were using high percentage ferrosilicons and also carbide of silicon (corundum). Calcium silicide—also from Niagara—had been tried as a substitute for aluminum in the ladle. I saw no drying stoves or annealing furnaces fired by producer gas, although at some places they were using natural gas for one or the other. The best designed drying stoves I saw at Pratt & Letchworth, Buffalo, N. Y. These were coke-fired under gentle blast pressure, and the stoves had exhausters to get quickly rid of the moisture-absorb-

ing air. The fuel for the annealing was generally coal, and the furnaces mostly of the pit type, with the roof in segments.

The molding sands much resembled the Belgian in appearance and nature, and came either from Illinois or the Albany district of New York State. These were well mixed and sifted before use, considerable attention being paid to their initial preparation. The facing sands were mixed with stale beer or molasses, and the molds, after well sprigging and tooling, were finished off with a paint of the very finest ground quartz silica, as fine as flour, mixed also with a little molasses water.

They did not seem to have heard of tar as a finish before pouring, nor did they seem to think that with their drying-stove practice they would get sound castings with tar residue on the molds. The wheels were molded with pins above and below and at the sides of the spoke junctions. It was a common practice to use a spinning runner, and to bring the rising head on to a portion of the boss only, with two or three narrow risers on the rims. The test pieces were brought on to the bottom of the balance weights.

American and British Specifications

The comparison in Table 1 between American and British standard specifications for railroad rolling stock material may prove interesting. As will be observed, the Americans have three classes of castings. In all the cases noted, a 90 deg. bend is specified, except in the case of the American soft castings, for which a 120 deg. bend is specified. The British bending test is, however, a bar 1 in. in diameter and the American

Analysis of American Steel Casting

Kind of Casting	Carbon, Per Cent	Sili- con, Per Cent	Manga- nese, Per Cent	Sul- phur, Per Cent	Phos- phorus, Per Cent
Wheel center bar frame, Pratt & Letchworth, Buffalo, N. Y.	0.22	0.28	0.74	0.041	0.02
Wheel center at Dunkirk Railway shops	0.32	0.32	0.76	0.07	....
Machine casting, Union Steel Casting Co., Pittsburgh	0.33	0.22	0.76	0.026	0.037
Mill housing, Mackintosh & Hemphill, Pittsburgh	0.46	0.24	0.74	0.046	0.033
Mill gear wheel, Otis Steel Co., Cleveland	0.54	0.25	0.72	0.05	0.027
Hard roll casting, Mesta Machine Co.	1.20	0.27	0.73	0.02	0.03
Locomotive axlebox, Pratt & Letchworth	0.36	0.25	0.89	0.042	0.023
Locomotive bar frame, Union Steel Casting Co.	0.23	0.26	0.84	0.037	....
Casting for electrical work, Westinghouse Electric Mfg. Co., Pittsburgh	0.39	0.30	0.79	0.017	0.015
Locomotive bar frame, Baldwin Locomotive Works, Philadelphia	0.31	0.28	0.51	0.025	0.024
Gun-carriage casting, Midvale Steel Works	0.29	0.23	0.63	0.08	0.01
Steel casting for high magnetic permeability, General Electric Co., Schenectady	0.14	0.20	0.64	0.05	....

1 in. x ½ in. A very much smaller proportion of the work is tested in America than is the case here.

A specialty of the steel foundry in the works of the Mesta Machine Co., Pittsburgh, was the making of large nickel steel castings such as driving pinions for rolling mill work and special rolls. A big machine-molded double-helicon pinion for a new 33-in. mill for Homestead was said to be of steel of the following composition: Nickel, 3.25 per cent, carbon 0.35 per cent, silicon 0.30 per cent, and manganese 0.45 per cent. In this foundry natural gas was being used for all the three operations of melting, annealing and drying. An electric welder giving 900 amps. at 90-110 volts was employed in cutting off gates and heads up to a considerable size. Wages of the head melter ran to \$175 a month. The minimum rate paid to the molder was 36c. per hr. for a 54-hr. week.

At the Union Steel Casting Co.'s foundry at Pittsburgh I witnessed the casting of locomotive bar-frames of the usual American type; the great difficulties involved had been most successfully overcome. A feature was the addition of vanadium to the steel for such castings; the expense of this was doubtless justified for such responsible work. The effect of the vanadium was to increase the elastic limit by about 30 per cent; it also acted as a scavenger of the steel. From 0.10 per cent to 0.20 per cent was added. The annealing had to be very thoroughly done, as vanadium steel castings are more brittle than carbon steel castings in the unannealed state.

Some of the analyses of American castings which I obtained may prove interesting. They represent the very finest American steel casting practice.

Practice in Belgium

Dealing with the new-form Siemens furnace, the author states that at Cockerills, in 1913, the furnaces had been altered so as to be fired with coke-oven gas, another instance of the Belgian striving for economy; in the larger furnace the gas producer remained in case they ran short of coke-oven gas, but in the case of the smaller furnace the gas producer had been removed altogether. The usual proportions of the charge were 30 to 35 per cent of hematite and 70 to 63 per cent of steel scrap. The foundry had both gas and coal-fired annealing furnaces. They had an excellent gas-fired annealing furnace of the new-form type with movable bed. The drying stoves were coke-fired, but it was intended to fire them with coke-oven gas later on. All important and larger molds were stoved; there was however, a lot of smaller green-sand work. They had three sand mixers of the revolving pan type, and also of the revolving screen type. They used a ball mill for grinding silica paint. They had the most excellent natural sand to work with, and the mixing of these sands in various proportions had been reduced to an exact science. He had never seen locomotive wheel

Table 1—American and British Standard Specifications for Steel Castings

	Physical Requirements			
	Tensile* Strength	Yield Point*	Elong. in 2 In.	Concn. of Area
American standards:	Tons	Tons	Per Cent	Per Cent
Hard castings	37.95	17.00	15.0	20.0
Medium castings	31.25	14.06	18.0	25.0
Soft castings	26.79	12.05	22.0	30.0
British standards:				
Castings with wearing surfaces	35	....	10*	....
General castings and wheel centers	25	....	13*	....

*Minimum.

Chemical Requirements

	Sulphur Per Cent	Phosphorus Per Cent	Remarks
American:			
Steel castings			O.H., crucible or Bessemer
Steel ordinary		0.08	0.40 per cent C. max.
Steel subject to test	0.05	0.05	0.40 per cent C. max.
British:			
Steel castings			Any approved process
Steel ordinary	0.07	0.07	
Steel subject to test	0.07	0.07	

centers that required so little fettling as was the case in this foundry. The application of the coke-oven gases for steel melting was a fact of great technical interest. The relative composition of the three gases at Seraing was as given in the following table:

Composition of Belgian Gases

	Coke-oven Gas, Per Cent	Producer Gas, Per Cent	Blast- furnace Gas, Per Cent
Hydrogen	57.00	12.00	3.00
Carbon monoxide	6.00	19.00	26.00
Carbon dioxide	2.00	8.00	11.00
Methane	23.00	2.00	....
Nitrogen	12.00	59.00	60.00
Total	100.00	100.00	100.00

As would be seen, the coke-oven gas was similar in composition to water-gas, and from its richness and calorific effects was said to be cheaper to use than producer gas. The coke-oven gas could not be used for the drying stoves, as the hydrogen burnt to water-vapor.

The speed of melting of the steel furnaces was from three to four charges per day in either case, and this indicated sufficiently the efficiency of the coke-oven

gas firing. The steel produced from the furnace was remarkably fluid, and of a very mild and tough quality. This foundry was altogether of remarkable technical interest.

With further reference to the subject of this rich-gas firing, they had also adopted this in the case of a 12-ton open-hearth furnace in another part of the works. The rich gas was admitted cold, the air alone being regenerated, the regenerators being about double the usual size. It was stated that the production was four charges per 24 hr. equaling 48 tons, and that about 4000 tons were produced in one run.

French Foundry Practice

At a steel foundry in Northern France they were, in the early part of 1914, getting the following excellent results with a 5-ton Siemens basic new-form open-hearth furnace. No less than five charges per day of from four to five tons each were melted, according to the following time-table:

No.	Time of Charging	Time of Tapping	Total Time
1	1 a. m.	4.30 a. m.	3 hr. 30 min.
2	5 a. m.	8.15 a. m.	3 hr. 15 min.
3	8.45 a. m.	12 noon	3 hr. 15 min.
4	12.20 p. m.	3.40 p. m.	3 hr. 20 min.
5	3.55 p. m.	7 p. m.	2 hr. 55 min.

The mixture used was as follows:

French hematite pig	656 kilos
Soft steel scrap	3,400 kilos
Final silicon and manganese additions	54 kilos
Total	4,104 kilos

In none of the above cases did the finished carbon exceed 0.20 per cent. Belgian molding sand was used, and a large amount of work was cast in un-stoved molds.

At another steel foundry in France, just over the Belgian border, where they had already four small converters, they had erected a new-form Siemens melting furnace (this was also just before the war) in which they made two charges per shift easily, as the following shows:

No.	Time of Charging	Finish of Charging	Completely Melted	Tapped at	Weight of Charge
1	6.20 a. m.	7.11 a. m.	10.20 a. m.	11.35 a. m.	5,581 kilos
2	1.00 p. m.	1.40 p. m.	4.20 p. m.	5.35 p. m.	6,090 kilos
					Total 11,581 kilos

The coal used on the above occasion was 2646 kilos, or about 4½ cwt. per ton of steel charged. The furnace hearth was composed partly of dolomite and partly of magnesite. The charges were very hot and ran about 0.15 per cent of carbon. The molds were mostly for mild-steel locomotive wheel centers, these being stove-dried; a lot of green-sand castings were also made from the same charge.

The above works were of particular interest, as owing to their connection with one of the most efficient and successful Belgian steel foundries working with small converters they represented every development hitherto reached in French and Belgian small-converter foundry practice, while since 1914 they had at their disposal open-hearth steel, which, being melted on a basic hearth, was purer and more homogenous than converter steel, and which they were able to produce almost as soft and fluid as converter steel. They might be said, therefore, to possess the last thing in respect of open-hearth practice as applied to the production of steel castings.

Particulars of a process for removing the temper from hardened steel are given in the Swiss journal, *Die Elektroindustrie*. The piece to be softened is placed on a plate of iron at red heat and covered by a plate of cold iron. After the whole has cooled the piece of steel, whatever was its previous quality and degree of hardness, is detempered completely, and can easily be worked without its quality having undergone any change by, for example, decarburization. The method is specially applicable to the unhardening of tools, more particularly punches and dies. Tests have given excellent results, and the method has the advantage that shaped pieces of steel do not show any shrinkage after treatment.

Cost System for a Medium Size Foundry

The Various Forms Which Have Proved Their Usefulness After Several Years' Experience Following a Period of Financial Losses

BY D. O. BARRETT, M.E.

THE essentials of the foundry system described in the present article were put into operation several years ago by a firm which had taken over a medium size foundry which had previously proved a losing proposition for its owners. This plant had been devoted to the manufacture of internal combustion engines, but a large percentage of the castings made in the foundry was jobbing work. For a short time after taking possession, this same work was continued at the former prices, but it soon became evident that on certain classes of work there was a gain, while on others there was a considerable loss, but it was impossible, under existing conditions to draw the line definitely between the two. As no attempt had previously been made to determine the actual cost of producing castings, the selling price had merely been determined by "guess," which is sometimes erroneously known as "good judgment." If operations were to continue, some method was absolutely necessary whereby the cost of each casting could be ascertained at the time it was made and not weeks or even months later.

Some difficulty was experienced in making a few of the firms realize the necessity in raising the price of castings, but when they properly understood the conditions no further trouble arose. Various changes have been made in the system as necessity arose or as conditions changed, but the

results obtained have amply justified the installation and the labor involved. As a machine shop was operating under the same management, but one clerk was employed, who took care of the foundry orders and costs as well as those for the machine shop. With the use of the adding machine, the time for making out the various reports was considerably shortened.

The original orders were made out by the cost clerk on the stock form shown in Fig. 1, this same form being used for the machine shop as well. An ordinary "in-and-out" clock was used in the foundry and the time card shown in Fig. 2 recorded the total time for all labor. As the orders arrived in the foundry the foreman made out the time slips for the next day's work, and these were dropped into the proper pigeon holes at the clock at the close of each day. The order number, pattern number, workman's number, and the number of castings to be made, were marked on the card, and, in the case of foreign patterns or where the molder was unfamiliar with the work, the name of the pattern was given so that there would be no trouble in identifying it. The entire day's work was laid out, wherever possible, the molder merely taking out the time slips in the order in which they were placed in his compartment, checking "out" on the one finished and "in" on the next job. The same card was also used in the core room.

Fig. 1: Stock Order Form

Date Billed 6-1-15	No. ①	Salesman	File 414
Terms	Sold to Standard Co.		Date Billed
Amount Paid	P. O. and State		Lodger
	Ship to	Ship via	
PROFIT	SHIP'S CHARGE	QUANTITY	Put only one order on a sheet
		6 L139	REGISTER NO.
		6 L139A	WEIGHT
		25 14613 with Bracket	PRICE
			Customer must not use these columns
			AMOUNT
			NETAL

Fig. 2: Foundry Time Slip

ORDER NO. 414	PATT. NO. L139	WORKMAN NO. 13
WORKMAN 6	RATE	FINISH
NAME OF PATT. H. 17	NO. GOOD CASTINGS	START
	②	ELAPSED TIME
		TOTAL COST
		COST PER PIECE

Fig. 3: Pattern Record

Name of Part Piston	Part No. L13
Wood	Metal H. P. 85
Rack 3	Tier A
Number Core Boxes 2	Shell 6
Number Used Per Engine 1	
Other Sizes Used on	③
	PATTERN RECORD

Fig. 4: Itemized List of Castings

CUSTOMER	THEIR NO.	PATT. NO.	NO. PCS.	WEIGHT	OUR ORDER NO.
Standard	196A	L139	6	146	414
	196A	L139A	6	10	414
Company		H. 17	20	595	415
		B56	10	6	416
		④			

HEAT REPORT OF LABOR
Foundry Department

Date July 28-3-15.

PATTERN NO.	Cast	Workman No.	Workman No.	Workman No.	Workman No.	Workman No.	Workman No.	Workman No.	Workman No.	Workman No.	Workman No.
2 DE1	1243										
4 JK13	354	2-5F									
1 A529	2670			8 1/2 110F				8 1/2 110F			
5 BC10		10 - 23									
5 533	287	75 - 1.72									
5 AK11		40 - 72									
7 547		10 - 24									
7 A422		95 - 1.17									
7 A2614	6.22	327 - 3.96									
7 A1213		48 - 61									
6 A201		20 - 24									
3 J20	6.22										
6 DE13	5.06	10F									

REPORT OF FOUNDRY HEAT
Date 6-3-15

ITEMS	WEIGHT	PRICE	COST
Pg-Castings	<u>3600</u>	.65	<u>23.42</u>
Pg-Northers	<u>2700</u>	.70	<u>18.95</u>
PG	<u>3400</u>	.68	<u>23.12</u>
Spry Iron	<u>300</u>	.75	<u>2.25</u>
Spry Steel	<u>10500</u>		
Total Weight	<u>16000</u>		
Coke Used			<u>79.69</u>
Labor			<u>30.00</u>
Fixed Charges			<u>180.71</u>

FOUNDURY COST REPORT BY PIECE
Date 6-17-15

Quantity	Pattern No.	OWNER	Wages	Worth	Mat.	Prod.	Coke	Gate/Cut	Loss	Profit
5	14613	Standard	44	11	.44	10	.38			
2	139-A		520	18.20	4.68	3.27	.05	.53	.09	
1	816	Company	2 1/2	300	7.50	2.70	2.10	.50	5.30	
4	858		4	.10	.04	.25	.25	.29	2.20	
1	1640	Not Filled								
540	Totals		1450	36.25	13.08	6.70	2.50	5.70	10.60	
	Previously Reported		3658	84.36	32.92	24.18	10.44	67.59	8.15	
	Net Gain		3658	84.36	22.92	20.58	3.60	5.80	5.80	
	Standard									
	A.E. & Co.		.09	9.08						
	Jahnsen Bros.		2.17	1.56	.61					
	Company		.09	4.68						
	Total		2.35	15.32	6.1	7.318				
	Net Gain		27.67	24.92	22.37					
			2492	24.92	22.18					

FORMS USED IN ASCERTAINING MOLDING AND METAL COSTS

Forms Used in Ascertaining Molding and Metal Costs

The patterns were stored in a separate fireproof building, and one man was delegated to get all patterns into and out of the foundry, obtaining the necessary information from the cards or the foreman, on the day previous to their being required. In the storage, a card was kept for each pattern as shown in Fig. 3. A card was also made out for all foreign patterns and coreboxes as soon as these arrived, the dates of arrival and departure being recorded on properly ruled spaces on the back. These cards were filed under the firm name, and when the patterns were removed from the foundry the cards were also taken out of the "active" file but still preserved so that their movements could be checked at a later date, should any controversy arise. They were also put back into service if the same pattern should make its appearance later.

The castings were removed from the sand by the night gang and the list of the good castings, together with the weights of the defectives and sprues handed to the foreman as soon as cleaned and rattled. In order to keep a better check on the work of the molders, the defectives and the sprues were weighed and entered separately.

The castings were assembled according to order number and entered on the itemized list, Fig. 4, at the same time checking off the original order and also entering the same number on the time card of the molder. The molder, having previously en-

tered the number of molds made on the card, his percentage of loss could be determined at once from a glance at the various time cards. The time cards, itemized list of good castings, heat report, and any orders which were finished, were now sent to the cost clerk. The heat report, Fig. 5, contains the amounts of metals and coke charged to the cupola together with the weights of defectives and sprues. The figures entered by the foundry foreman are underlined.

The cost clerk now completed the time cards by determining the elapsed time and the total cost according to the various rates of pay. The molder's pay was figured from the regular clock card, the difference between the two giving the amount of non-productive labor to each molder, this covering pouring off and cutting sand. No time slips were used by helpers or other non-productive or indirect labor. The results from the time slips were now transferred to sheet No. 6 with the overhead prevailing at that particular time added to the direct labor cost. This percentage of overhead for the period given is shown on the summarized report for the year. These values were collected in this manner, as oftentimes two or more men worked on the same job, where large, or more often the same man worked on several jobs at once, that is, several patterns were placed in the same flask. An example of this is shown, and the

total cost is split up in the same ratio as the weights of the finished pieces. By dividing the total cost by the total weight, the cost of each piece will be found opposite each on the slide rule, making only one setting necessary to get the various amounts. While this might not be theoretically correct, due to the fact that one pattern might be somewhat more complicated than another, it was about the only method possible to arrive at an average cost and was at the same time sufficiently accurate for all practical purposes.

From the itemized list of castings turned in by the foundry the cost clerk now makes out sheet No. 7, giving the quantity, pattern number and weight, classified as to ownership, this being obtained from the order numbers on the list. Knowing the price at which the castings were sold, the column headed "worth" was then filled out. The column, "material," represented the cost of the molten metal as taken from the cupola spout, this comprising the cost of the metals and coke as shown on the heat report, together with flux or other material used. The cupola labor and depreciation were taken care of in the burden on direct labor. The "molding cost" included the overhead and was taken from sheet No. 6 and the "core cost" from a similar sheet.

In this particular foundry the core cost was made a separate item, since in many cases it exceeded the molding cost while in others it was nil. It was somewhat more difficult to keep an accurate cost on the cores since a large number might be made up, but, if left for any length of time, some would deteriorate or become broken. A fair average

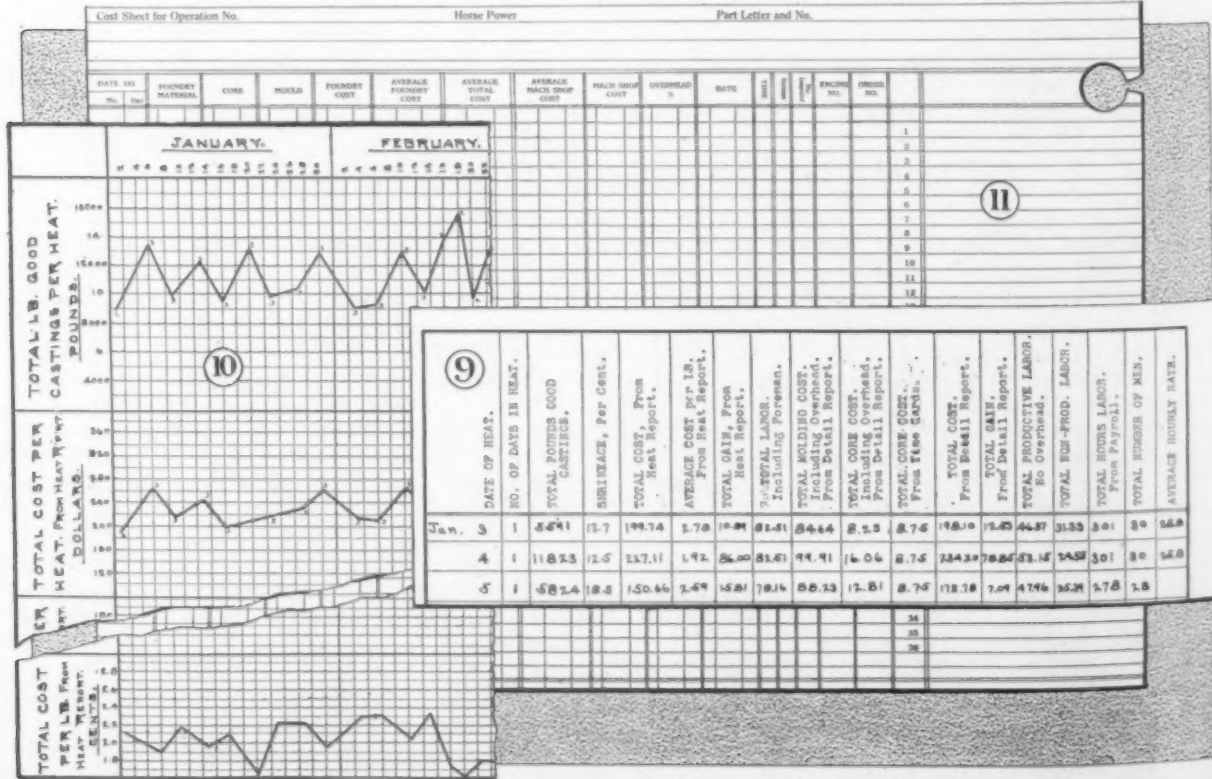
was obtained by recording the number of cores belonging to any certain part number with the cost for the complete set and then checking off as used. These were usually made up in complete sets by the same core-maker, this facilitating matters somewhat. For the reasons above stated, an accurate check was never possible, but, as the cost for each set remained practically uniform, there being no losses as in molding, an average value was used and a certain amount

added to any pattern in which stock cores were used, it being impossible to account for these in any other manner. As very few cores stood over for any length of time, an effort was made to keep the total core cost each day equal to that obtained from the time cards, plus, of course, the percentage of overhead prevailing. By keeping these amounts equal, the only error was in getting charged to some particular pattern a slightly higher core cost, but this was negligible. The cost clerk should, of course, be familiar enough with the various patterns to pick out immediately all those in which any cores are used and he should be able to estimate the core cost where it is otherwise impossible to obtain it.

The total cost was now obtained by adding the material, molding and coremaking costs, and that, compared to the selling price, shows either a loss or profit on each item. Should any piece not be poured, that heat, in other words, stand over, the labor values were, of course, entered and made a seeming loss. When the casting was poured, the only actual cost for that day was the material used, but, in order to have a complete record of the piece

SUMMARY FOR YEAR 1918.		
FOUNDRY.		
Jan. 1 1918 to Jan. 1, 1919.	Heat Report	Detail Report.
Total pounds gone castings.	1,801,966	1,801,986
Total cost, including overhead.	\$28,055.65	\$28,266.39
Overhead.	Jan. 1 - Apr. 20 \$10. Apr. 22-Dec 31. \$15.	Coremakers, 100% Moulders 125%
Average cost per pound, for year	1.78 cents	1.79 cents
Total labor (including foreman.)	\$15,147.89	
Total productive labor.		\$8,346.66
Total non-productive labor.	\$6,801.23	
Productive, non-productive labor.	1.87	
Total number of heats.	146	146
Average profit per heat	\$69.15	\$66.26
Total profits for year.	\$10,096.95	\$ 9,676.03.

Fig. 8—General Summary for a Year



The Tabulation and Charting of Cost Data

for posting to the cost sheets, the labor values were again used and then deducted at the end of the report under "previously reported," this, of course, making that day's profit as much larger as the previous day's loss on the same item.

At the end of the report, a summary was given covering the work for each of the firms for whom castings were made so that the total loss or profit for the day for each could be ascertained at a glance. This was useful, as there would quite naturally be a loss on some items which would be more than compensated for on others. In quoting a price on castings where the weights do not vary too greatly, a flat price is usually given, and it is expected that on some of the pieces there will necessarily be a loss, or this might be due to losing a number of pieces, chargeable directly to the molder or coremaker.

It will be noticed that in the heat report the total cost of the heat is obtained by adding the cost of the material, the direct labor cost and a lump sum representing the fixed charge for that time. The amount received for the castings plus the credits for the defectives and sprues give the total credit and show whether the heat was a gain or loss. The various items were also worked out as percentages for the reason that they gave a check on the various weights. As cupola labor is usually not of the highest grade, it was discovered that the charges were not always reported correctly, the discrepancies sometimes being sufficient to change the results materially if not discovered in time. It was usual to determine the percentage at once as a check, and it was often possible to discover errors in this manner.

On the detail report the total cost of the heat is also determined and should, of course, equal that obtained from the heat report. Here, however, the fixed charges are inserted as a percentage on direct labor. If this percentage be properly worked out there will be hardly any difference between the two reports, each showing practically the same gain or loss. In a large number of these reports the writer has seen the two values almost identical for long periods. Should a large number of the coremakers or molders be absent for a day, of course, the percentage of overhead will change quite materially for that particular day and the detail report would then show a larger gain, but for day after day the two values should remain practically equal.

A printed form, 11 x 14 in., for a loose-leaf book, is used to list the various items entering into foundry expense for the year, and this, compared with the total sales for the year, will give the loss or gain for that period which may then be compared with the corresponding figures from the other reports and their accuracy verified. The three values should, of course, correspond, and should they do so, the accuracy of the detail figures are at once proved. In this manner an absolute check is obtained upon all the values used, and, during the first year, no doubt, the best that can be obtained will be but an approximation; after that an almost accurate determination of the overhead may be obtained and a higher degree of accuracy maintained the longer the system is in use. To the writer's mind the best feature is that the cost of the items are determined the day after the casting is made and it is not necessary to wait until the whole order is completed.

Fig. 8 shows a summary for the year, the items being taken from the foundry records. This shows quite clearly how near the values run from the two reports, there being but a relatively slight dif-

ference for the entire year, this difference giving but one one-hundredth of a cent in the cost per pound. It will be noticed that there was a decided change in the values for the overhead on the detail report.

Fig. 9 shows the data that was recorded daily from the various reports, a portion of this being transferred to the curves, Fig. 10. This graphically shows the results without the necessity of going through a mass of figures. The small figures at the points of the curves represent the number of days molding in each heat. The variations in the cost per pound may be easily explained in most instances from a study of the upper curves. The curves were not filled out for each heat, of course, this being done about every two weeks and showed at a glance whether the costs were rising or falling.

On all castings belonging to the company the various cost items were transferred to the cost sheet, Fig. 11. A separate sheet was used for each casting and on it were recorded the machining time and cost so that the cost of the finished piece was obtained, this being used in obtaining the cost of the assembled machine and in pricing repair parts.

Melting Steel Borings in the Cupola

The utilization of steel borings and turnings in the cupola to make malleable iron is urged as a distinct national advantage by J. E. Hurst in *The Engineer*, London. He states that the comparative ease with which steel borings in all but very finely divided forms can be melted in the cupola does not appear to be generally recognized. By using smaller charges both of metal and fuel, thus bringing about a more intimate mixture of fuel and material, and, incidentally, a more extended melting zone, steel in this form is very readily melted. This consideration is probably of great importance in insuring a more extended and greater degree of preliminary carburization of the high layers of the charge. Extremely finely divided steel borings have a tendency to throttle the blast and promote scaffolding. Probably the greatest drawback to the use of steel borings is the difficulty of handling for charging purposes.

The absorption of sulphur during the process is frequently very large. It can to some extent be checked in the cupola by the addition of sand along with limestone flux. It is suggested that the use of low-grade manganese ores, which ought to be cheaply obtainable, would be of considerable advantage in the elimination of sulphur. With ordinary care, however, and the use of high-grade coke, the extent of the sulphur absorption is of little moment in this process, if the metal is intended for the English malleable process.

New Guns Stand Test

WASHINGTON, Oct. 1.—The first carload of guns from the new gun plant of the American Radiator Co., Bayonne, N. J., has been proved by the Bureau of Ordnance, Navy Department, at the Naval Proving Ground, Indian Head, Md., in the presence of Rear Admiral Ralph Earle, Chief of the Bureau; Capt. T. A. Kearney, Assistant Chief, and representatives of the American Radiator Co. Guns were selected at random from the carload consignment and put through exhaustive tests. Every gun successfully met the standard of Navy requirements. These are the first to be delivered on a contract for 2000 guns awarded this concern, and they show, says the announcement of the Navy Department, that another plant of great peace time capacity in far different lines has been converted to supply a vital war need.

The Liberty Steel Co., Warren, Ohio, will install an additional tin mill, making 9 in all. The installation at this time of the additional unit is to provide for emergencies should any of the other mills be compelled to suspend.

Washington Hopeful Regarding Steel Supply

Splendid Response of the Industry—War Industries Board Orders Retrenchment in Various Products—Coal and Labor Present Problems

WASHINGTON, Oct. 1.—After a week of sessions with various important factors in the iron and steel industry, the steel section of the War Industries Board will meet to-morrow to check up on the progress that has been made in stimulation of production and the retrenchment in consumption.

At the same time, it is expected that the figures for the current war requirements of the Government will appear in their final revision. For two months the War Industries Board and the various Government departments have been revising these important figures, and steadily revising them upward.

When they began in August, they aggregated about 20,000,000 tons of steel needs for the last six months of 1918. Some time ago they passed the 25,000,000 mark and are now reported to be nearer 26,000,000 tons.

As the result of conferences with representatives of the iron and steel industry in the last two weeks, however, the War Industries Board officials believe that it will be possible to meet the actual war necessities. Every branch of the industry has been spurred to the utmost, and each has responded in a way that has inspired confidence in the result.

At the bottom of all troubles are still the questions of labor and coal. This was most marked at last week's meeting of the pig iron producers. The advances granted on some grades of pig iron were not nearly so important as the question of better coke and more of it.

Fuel Administration Will Help

This was true in all fields. The Fuel Administration was represented at the meeting and promised to do all in its power to remedy this evil by inducing the miners to produce cleaner coal and by stimulating the production of better coke from all ovens.

The Southern pig iron operators complained that they were practically hampered also by a shortage of labor for the furnaces and in the mines and at the ovens. Lack of transportation was less important as a hindrance in the South than in the North, but the Railroad Administration also promised to help.

At the present rate the yearly output of pig iron would be about 38,000,000 tons. The current steel requirements, however, demand a production of about 42,500,000 tons. A 10 per cent increase of the present quota would take care of this deficit. Every pig iron producer at the meeting pledged himself to do his utmost to reach this 10 per cent increase.

One important item of retrenchment was announced during the week. At the meeting of the wrought iron pipe manufacturers with the War Industries Board, the latter ordered a drastic restriction in the output of butt-weld pipe. Here a savings of about 300,000 tons a year is to be made, the production being cut from something over a million tons to between 700,000 and 800,000 tons.

Plates and Shell Steel

The steel section of the board also held long conferences with the representatives of the shell steel and steel plate producers. These are the two items for which there has been greatest call. The rapid movement of our army overseas and the continual offensive activities of General Pershing have necessitated an unprecedented demand for shell steel. The 11 hours of intense drum fire, for instance, which preceded our offensive northwest of Verdun, wiped out more shells than several plants can produce in a month. The same is true with the steel plate situation, for which the shipping board's program presents an insatiable appetite.

At both conferences, however, the producers promised to do their utmost and the War Industries Board

announced its confidence that their efforts would be successful.

In the meantime, the Steel Section is still at work on retrenchments, big and little. The board has issued the following summary of the various curtailments which have been announced:

Retrenchments Ordered

Agricultural implements and farm tractors—Effective Oct. 1 on a 12 months' schedule, curtailed in use of iron and steel 25 per cent from consumption for calendar year ended Sept. 30, 1918.

Bicycles—For the last four months of 1918, curtailed 15 per cent in iron and steel of the consumption for the last four months of 1917, with elimination of bicycles for children and for racing purposes. This is to save 2500 tons of steel in the next year.

Metal beds—For the last four months of 1918, curtailed to 50 per cent of the production of the last four months of 1917, which 50 per cent shall include Government and Allied orders, and that no brass beds be built except from stock now on hand and no brass scrap be purchased.

Black galvanized and enameled ware—For the last four months of 1918, curtailed to 50 per cent of the production for the last four months of 1917, which 50 per cent shall include Government orders.

Boilers and radiators—For the last four months of 1918 curtailed to 40 per cent of the production for the last four months of 1917 and all production and sale shall be under license from the War Industries Board or for Government buildings.

Cutlery—For the last four months of 1918, curtailed to 70 per cent of the production of the last four months of 1917, which 70 per cent shall include Government orders.

Gas stoves and gas appliances—For the last four months of 1918, curtailed to 50 per cent of the production for the last four months of 1917, all copper eliminated except that on hand, which should be conserved for repairs to existing installations.

Stoves—For the last four months of 1918, curtailed to 50 per cent of the production of the last four months of 1917, which 50 per cent shall include Government orders.

Passenger automobiles—For the last six months of 1918, curtailed to 25 per cent of 1917 production, provided the manufacturer will limit his purchases of materials, equipment and supplies to such as are absolutely necessary to match up stocks on hand.

Burial goods—Curtailed to 2200 tons of the iron and steel for the 12 months schedule.

Clothes wringers—For the last four months of 1918, curtailed to two-thirds of the production for the last four months of 1917.

Baby buggies—For the last four months of 1918, curtailed 50 per cent of the production for the last four months of 1917, and that they be given a Class "C" rating for enough metal to match up stocks now on hand provided discard steel only shall be used.

Tin plate—For the last three months of 1918, curtailed the use of steel 30 per cent from consumption of the last three months of 1917, an estimated saving of approximately 150,000 tons of steel.

Refrigerators—For the last four months of 1918, curtailed 33 1/3 per cent in iron and steel of the consumption for the last four months of 1917, with order for substitution of zinc plate where possible.

Non-War Construction

The War Industries Board has also announced a modification of the restrictions against new non-war construction. New buildings for farm purposes are to be authorized without special permit where the aggregate cost involved does not exceed \$1,000.

To show how far the orders for retrenchment have gone to take care of apparently unimportant items, instructions have been issued that tomato cans for the War Department must be filled to within 1/4 of an inch of the top. Some canners have been filling only to 1/2

of an inch, although the cans weighed the specified amount. It has been figured out that if this saving of $\frac{1}{8}$ of an inch were made in all No. 3 cans of tomatoes purchased by the army in a year, it would total 417,000 cases of tomatoes, costing approximately \$1,500,000. The saving in tin plate used in these cans would amount to 7,000,000 sq. ft.

The typewriter industry has been recognized by the War Industries Board as essential, but no automatic rating will be given the industry for its materials equipment and supplies. Consideration will be given to applications for priorities covering specific orders as such applications are presented by the manufacturers. Claims of the industry to preferential treatment in the matter of priorities were presented to Judge Edwin B. Parker, Priorities Commissioner, by the War Service Committee representing the typewriter manufacturers. Existing contracts made with individual manufacturing concerns by the Government and for war work direct were exhibited in support of the demand. The Priorities Division of the War Industries Board decided that because of the large demands made on them by the Government and by the war work, including production of typewriters which they now have in hand, the following plants be accorded preferential treatment, and given a Class 3 rating: Underwood Typewriter Co., Hartford, Conn.; Royal Typewriter Co., Hartford, Conn.; Corona Typewriter Co., Groton, N. Y.; L. C. Smith & Bros. Typewriter Co., Syracuse, N. Y.; Stenotype Co., Indianapolis, and the Remington Typewriter Co. plants at Ilion, N. Y., Syracuse, N. Y., and Bridgeport, Conn.

Because of the overseas requirements of soluble coffee for the army are nearly 12 times the entire production of soluble coffee before this country entered the war, the plants making the machinery necessary to produce this coffee have promised to run their plants day and night that this machinery may be supplied in the shortest possible time. The War Department has arranged with the War Industries Board for the necessary priorities of materials.

Blast Furnace Activity

Director General McAdoo of the United States Railroad Administration issued a report last week showing that in the Pittsburgh District 130 blast furnaces are in blast out of a total of 134. This is the greatest number that have been in operation at any one time since last December; in fact, the greatest number in blast at any one time in that territory for many years. No furnaces in that territory are banked or out of blast for the lack of coke or other causes within the control of railroads, while only four furnaces are out of blast for relining and repairs. On Feb. 7 to the present year in that district there were only 82 furnaces in blast, while on the same date 38 furnaces were banked or out of blast for want of coke; 14 furnaces being out of blast for relining and repairs.

W L.C.

Air Screen to Protect Furnace Workers

The latest methods employed in Germany for screening furnaces were described recently in an article in the *Zeitschrift des Vereins deutscher Ingenieure*. Workers tending furnaces, and required to examine the glowing material at frequent intervals, suffered a great deal from the excessive heat radiated, and various devices have been tried to minimize the ill-effects. For example, hollow water-cooled furnace doors have been tried, but they only afforded protection while they were closed. Again, devices have been installed for drawing off the hot air in front of furnaces by centrifugal exhausters placed in front of the furnace opening. An objection to these is that workers are subjected to great variations in temperature, prejudicial to health. According to the article, the most effective device is fixing immediately behind the furnace door a narrow, oblong nozzle, through which cold air is blown upward, thus interposing a screen of relatively cool air between door and furnace. This arrangement is stated to give adequate protection to the worker, and has the incidental advantage that when the doors of the furnace are opened the escape of flames is checked.

Plant Railroad Hazards

In analyzing the causes of accidents around factory railroad tracks and sidings, before the iron and steel section of the National Safety Council, Sept. 19, C. H. Baltzell, superintendent St. Louis & San Francisco Railroad, Fort Smith, Ark., pointed out the great danger to boys and new employees from imitation of older workmen who are permitted to persist in careless habits around railroad tracks. He emphasized the following cautions:

Careful inspection should be made by railroad division officers of all conditions surrounding industries and immediately necessary steps should be taken to make safe any condition that is not right. If it is impracticable to make such changes then we should specialize and co-operate with industrial people in order to avoid personal injury at that point.

Cleanliness and order is one of the strong features in safety work. There should be no obstructions lying about whereby men might trip, fall and get hurt. Frogs and switches should receive proper attention and all other spaces around railroad tracks that might catch the feet of employees or passers should be filled with metal or wooden blocking. Wooden walks and hand railings should be maintained so as to make safe locations not already protected. I believe in signs. Danger signs should be installed in conspicuous places to give warning.

The practice of some industrial workmen when moving cars or attempting to do their own switching by team or hand power, when they frequently leave cars fouling other tracks or throw switches and leave them in improper positions, is a dangerous custom. Matters of this kind should be discussed with plant employees and managers, pointing out to them the disastrous results that might follow. This appears to me one of the best methods of securing results.

Yard men and trainmen should be unusually cautious and careful about disturbing cars that are being loaded or unloaded. Due notice should be given men working in or about the cars before coupling is made. At all obscure points, where the view is not entirely clear unusual precaution should be taken by both yard and industrial men and sufficient lights should be maintained at night. Yard men should be coached to be careful and to keep a sharp lookout, to sense the danger at any given point, anticipating what the other fellow might do, for we know from experience and observation that there are a great many train and enginemen who avoid accidents and personal injuries, not only to themselves but to others, by figuring ahead and having in mind the conditions at hand. Division officers, yardmasters, engine foremen and yardmen generally can assist in this matter by talking with industrial employees, calling attention to the danger of the unsafe practices indulged in by industry employees.

Cast Steel Chain Cables

A memorandum regarding the manufacture of and testing of cast-steel chain cables, giving a history of this departure from the method of manufacture hitherto followed, and particulars concerning the testing of cast-steel chain cables has been issued by Lloyd's Register of shipping, according to *Engineering*. The memorandum gives the following procedure as a tentative arrangement to provide a satisfactory method of testing cast-steel cables, whatever be the country of manufacture: The breaking and tensile tests for cables of all sizes should be based upon 50,000 lb. and 36,000 lb. per sq. in. on the section of the links. It is essential that cast-steel chain cables shall be properly annealed after casting; this annealing should be the final operation of manufacture. The memorandum then details the conditions under which the tests are carried out.

White zirconium oxide, practically pure, is now being manufactured in Great Britain by the Zirconium Syndicate, Ltd. The production of zirconia on a substantial scale and at a commercial figure has, it is believed, never been accomplished before outside of Germany.

AMERICAN CHEMICAL EXHIBIT

Marked Progress in Many Lines—Potash from British and American Blast Furnaces

What is conceded to be the most successful and largely attended chemical exposition ever held in this country took place last week, Sept. 23 to 28, at the Grand Central Palace, New York. Each day of the week crowds filled the three floors where the remarkable strides made since the war started were in evidence in numerous booths at the fourth National Exposition of Chemical Industries.

The exposition showed this country to be dominant in the chemical arts of both peace and war—in dyes, in explosives, in nitrogen fixation, in ceramics, and in poison gas. Many German markets have been seized, particularly those of dye stuffs. The exports of these as well as of chemicals also reveal considerable expansion, even after supplying the home demand. In alloys and in metals and in potash supplies surprising developments have taken place.

On the afternoon of each day, sessions of a technical nature were held at which prominent manufacturers and technical men made addresses on leading phases of chemical development. On Wednesday afternoon, American supplies of potash was the principal topic, while Friday afternoon was devoted to a session on the metal industry.

Potash From Blast Furnaces

Before the war Germany was the principal source of the world's supply of potash. Both Great Britain and America have had to make strenuous efforts to make up the deficiency since. At the meeting on Wednesday it seemed to be the consensus of opinion of the experts discussing the subject that with proper application American needs could be adequately met in the future without importation from Germany.

Linn Bradley, chief engineer of the Research Corporation, New York, whose subject was "Recovery of Potash from Iron Blast Furnaces and Cement Kilns by Electrical Precipitation," said the industry may be roughly divided into those plants in which the recovered potash is the main product and those in which the potash is recovered as a by-product. He predicted that recovering potash from iron blast-furnace gases would enable England to obtain enough potash to equal her entire pre-war importation from Germany. France, he said, "will be recovering large quantities of potash from iron ores which Germany has made such strenuous efforts to control." He said that we now have sufficient furnace capacity in this country to produce annually over 1,500,000 tons of potash, far in excess of our pre-war requirements. If the furnace charges and operations could be adapted so that one-fifth of the amount, or 300,000 tons, could be produced this would meet our needs without assistance from any other source.

Mr. Bradley added that "it should be pointed out that in the Alabama district there is an abundance of excellent coal, labor is plentiful and cheap, the climatic conditions are such that the district may be considered an all-year one as far as operating is concerned. When it is realized that there is immediately at hand an enormous tonnage of high-grade iron ore which carries a large potash content and that the South produces our cotton and therefore is the large consumer of potash, and thus provides a large market within a few miles, the economic importance of this situation can be better appreciated.

"The South produces pig iron cheaper than any other district in normal times. It does not yet consume as much iron and steel products as its population justifies, and, therefore, its iron must carry a high freight charge if it is shipped North to the larger markets. In the future, more and more iron and steel will be consumed locally, as it is evident that the South is coming into its own very rapidly. The additional profit which can be obtained from the potash will be of great assistance in keeping iron furnaces in blast

when the market sags. The South has a very fortunate combination of labor, raw materials, climate, and a large and near fertilizer market."

The Ferroalloy Industry

At the session on Friday afternoon, devoted to metal industries, H. C. Parmelee, managing editor *Chemical and Metallurgical Engineering*, presided. Theodore Swann of the Southern Manganese Corporation, Anniston, Ala., told of extraordinary production of ferromanganese in the United States since the start of the world war.

"Prior to 1914 the United States produced less than one-half of its ferromanganese requirements," Mr. Swann said. "In 1917 the total requirements increased to 331,381 tons, of which 86 per cent was produced in the United States and in 1918 the percentage of home production will not be less than 90 per cent.

"The shortage of shipping brought about by the war made it necessary that the United States develop its own ore resources. The production of manganese ore in the United States in 1914 was 2635 tons, insufficient to make one-half of one per cent of the ferromanganese required. Domestic ore in 1915 increased to 9700 tons, about 2 per cent of our requirements. During 1916, the production more than trebled the previous year, with 26,997 tons, or nearly 3 per cent of our increased use, and in 1917, this was quadrupled with 113,734 tons, 10 per cent of all the ferromanganese required.

"During the first six months of the present year 1918, high grade domestic manganese ore production was greater than that of the entire year of 1917, with prospects for increase in the second half. Last July the percentage of metallic manganese from domestic ores was 47.9 per cent."

He paid tribute to the many producers who, by their efforts, were helping the United States to conserve its shipping for war uses, and he said that the manufacture of ferromanganese in the electric furnace was one of the important developments here.

The other speakers were Prof. Joseph W. Richards, Alcan Hirsch and Dr. Leonard Waldo, all of whom reported progress in the production of alloys indispensable to the metal industries. Mr. Hirsch discussed ferrocerium and Dr. Waldo the American manganese industry. Dr. Richards of Lehigh University and a member of the United States Naval Consulting Board said ferroalloys were important factors in producing both ordinary and fine steels, and therefore in winning the war.

Sing Sing Addition Will Not Be Built

WASHINGTON, Sept. 30.—Chairman Baruch of the War Industries Board, has announced that the New York State Commission on New Prisons has abandoned a project for new Sing Sing prison buildings, which amounted to about \$1,244,692. This action is in line with the ruling contained in the letter recently sent by Mr. Baruch to Mayor John F. Hylan, of New York City, disapproving this year's new public school building program for that city, which involved more than \$9,000,000, on the ground that both the labor and the material necessary would be needed in the war program. Governor Whitman, of New York, approved the action of the commission in rejecting all bids for the new structures.

The Norwegian machine industry is at present trying, the same as the Swedish, to strengthen its competitive power by combination. A fusion along big lines, using as a nucleus the two combined companies called Aktieselskabet Norsk Maskinindustri, has recently been consummated and the capital increased from 12,500,000 to 32,000,000 crowns. Six companies have joined in the combination and negotiations are being carried on with the seventh, Rosenberg's mekaniske Verksted in Stavanger. By this selection it is hoped to get a complete representation of all branches of the machine industry, and it is the intention to specialize.



The Milwaukee Auditorium

Foundry and Allied Industries at Milwaukee

Details of the Foundry and Machine Tool
Exhibition in the Milwaukee Auditorium—
Simultaneous Meetings of Four Associations

FOUNDRY week this year begins Oct. 7 and will be celebrated at Milwaukee. It will be unusual in that the iron and steel section of the American Institute of Mining Engineers has arranged to hold meetings at the same time, and also in the fact that the nonferrous technical sessions will be conducted by the Institute of Metals division of the American Institute of Mining Engineers, the American Institute of Metals having in the year been merged into that organization. Besides these the American Malleable Castings Association has called its members to Milwaukee. The annual meeting of the American Foundrymen's Association is thus signalized by simultaneous sessions of three other strong organizations, while the annual exhibit of foundry machinery, supplies and equipment and machine tools will, it is stated, be the largest of its kind ever held without exception.

Both the exhibition and the meetings will be held in the Milwaukee Auditorium. Registration will take place there, and there are a number of meeting halls to provide for the different sessions which must go on at the same time. On the main floor of the Auditorium

itself will be found a part of the exhibition and on the level below will be arranged the working exhibits. The exhibition will open on Monday afternoon, Oct. 7, and close Friday evening, Oct. 11, but the first of the technical sessions is scheduled for Tuesday morning as a joint meeting of the four organizations named, with addresses calculated to sound the keynote of the week's contributions to industrial progress; namely, the acceleration of production for winning the war.

No less than 80 papers and other contributions are on the program, covering gray iron, malleable iron, steel and non-ferrous foundry practice; iron, steel and non-ferrous metallurgy; coal and coke, and accident prevention. Entertainment and other social features of the conventions promise to be noteworthy and have been arranged by committees of Milwaukee's metal and metal-working industries. Following are lists of the exhibitors, containing information of the leading features of the exhibits and the names of the representatives in attendance from the different companies, and a map, with a list of metal-working and other plants, of Milwaukee and vicinity.

Exhibitors and the Products Displayed

ABELL-HOWE CO., CHICAGO.—Howe trucks, arranged both for hand trucking and equipped as trailers for trucking with a power tractor. Represented by O. J. Abell, president; R. E. Stuntz, sales manager, and J. O. Humbert.

ABRASIVE CO., CHICAGO.—Exhibit of Electrodon wheels, which are used for the grinding of cast iron, brass, bronze and all metals of tensile strength; also Boro-Carbene wheels, which are used for all classes of steel grinding. Represented by Clyde W. Blakeslee, manager Chicago branch; Herbert A. Loomis, Milwaukee representative; George J. Bassler and F. B. Miller, salesmen.

AMERICAN FOUNDRY EQUIPMENT CO. AND SAND MIXING MACHINE CO., NEW YORK.—Sand cutting machine and a special design of its Humane type sand blast rotary table room. Represented by V. E. Minich, vice-president and general manager; Hutton H. Haley, Western district manager; John D. Alexander, central district manager, and R. L. Wadsworth, manager production and design.

AMERICAN GUM PRODUCTS CO., NEW YORK.—Cores and castings made with Goulac core binder. Represented by Gordon I. Lindsay, general manager; W. Ed. Baird, manager foundry department, and O. B. Parker, A. J. Kies, M. F. Coughlin, salesmen.

AMERICAN KRON SCALE CO., NEW YORK.—Portable platform scale. Represented by W. W. Camp, Chicago manager; C. F. Larson, district engineer, Chicago; E. Ohnell, vice president, and E. M. Abramson, Cleveland manager.

ARCADE MFG. CO., FREEPORT, ILL.—Working samples of molding machines, jolt stripping plate machine, combined jolters and squeezers, air squeezers, hand squeezers, power rock-over pattern drawing machine, core machines, core jolters, etc. Represented by Henry Taschering, August Christen, Mentor Wheat, R. E. Turnbull, G. D. Wolfley.

ASBURY GRAPHITE MILLS, ASBURY, N. J.—Graphite and plumbago. Represented by H. M. Riddle, Jr.

E. C. ATKINS & CO., INDIANAPOLIS.—Display of Kwik-Kut metal cutting machine, motor driven, Higley metal-cutting saws, Cochran-Bly metal-cutting saws, metal-cutting circular saws for all makes of machines, AAA hacksaw blades, pattern plates and metal-cutting band saws. Represented by T. A. Carroll, advertising manager; T. H. Endicott, metal cutting manager; William de R. Knight and G. W. Steenbergh.

AUSTIN CO., CLEVELAND.—Pictorial presentation of method of 30-day building construction model buildings shown. Represented by G. A. Bryant, general sales manager;

W. L. Bailey, district sales manager; W. F. Chambers, sales engineer; G. A. Dodge, equipment engineer; W. L. Towne, advertising manager.

BADGER-PACKARD MACHINERY CO., MILWAUKEE.—Products of several companies. Represented by W. L. Romaine, secretary; C. A. Schuman, vice-president; H. S. Molony, Paul Sladky and E. J. White, salesmen.

BARRETT CO., CHICAGO.—No products exhibited. Represented by William M. Wilson and H. R. Hansen.

BERKSHIRE MFG. CO., CLEVELAND.—Exhibit of air squeezer equipped with match plate with special device for closing mold on machine without removing cope; also an air squeezer equipped with standard aluminum match plate; other types of air squeezers, vibrators, knee valves, blow-off valves, etc. Represented by W. D. Fraser, manager, and G. L. Cannon.

S. BIRKENSTEIN & SONS, CHICAGO.—Non-ferrous metals. Represented by H. Birkenstein, C. Raphael, M. Isaacson, N. Slohn, H. Goldstine, M. Schero and S. Pfiaum.

G. S. BLODGETT CO., BURLINGTON, VT.—Portable ovens designed for baking small cores and largely used in brass foundries. This company also builds ovens for enameling, japanning, hardening and drying purposes, and small portable ovens especially adaptable for experimenting and testing purposes. Represented by R. L. Patrick, treasurer.

BLYSTONE MFG. CO., CAMBRIDGE SPRINGS, PA.—Blystone 7 cu. ft. sand mixer equipped with revolving riddle screen and electric motor. Represented by Luther G. Conroe, general manager.

BRISTOL MACHINE TOOL CO., BRISTOL, CONN. (Successor to C. G. Garrigus Machine Co.)—This company represented in the exhibit of the Federal Machinery Sales Co., Chicago, by L. D. Adams, secretary.

BROWN SPECIALTY MACHINERY CO., CHICAGO.—Hammer core machines, including the styles for making core $\frac{3}{8}$ to 7 in. in dia.; also an 84-in. rotary table sand-blast machine and a pneumatic charging truck for malleable iron furnaces. Represented by Elmer A. Rich, Jr., J. E. Sweet, H. T. Rich, John Laycock and Robert L. Laycock.

THE BUCKEYE PRODUCTS CO., CINCINNATI.—Buckeye crucible and non-crucible metal-melting furnaces for all fuels; oil and gas burners, compressed air and electric vibrators, Buckeye oils and compounds. Represented by C. J. Goehringer, president; R. B. Ferguson, B. Bernbaum, C. Gysin, E. L. Bunting.

CARBORUNDUM CO., NIAGARA FALLS, N. Y.—Wheels and materials manufactured by this company for the foundry. Represented by Anthony Dobson, acting manager Milwaukee store; Edward Edwards, J. M. Engman, B. Leve, R. C. Bradbury, H. E. Kerwin and W. E. Knott.

CHAMPION FOUNDRY & MACHINE CO., CHICAGO.—A Champion electric sand riddle in operation, also the company's new jolt roll-over power molding machine. Represented by T. J. Magnuson, president; H. O. Magnuson, secretary, and A. Magnuson, superintendent.

FRANK D. CHASE, INC., CHICAGO.—Photographs illustrating plants of its design.

CINCINNATI PULLEY MACHINERY CO., CINCINNATI.—A 20-in. high-duty pulley lathe and a pulley tapping machine, also several types of Avey drilling machines in operation. Represented by L. B. Patterson, J. G. Hey, J. F. Mirrielees and C. K. Cairns.

CHARLES J. CLARK, CHICAGO.—Blast volume meters for cupola and other furnaces; also blast pressure gages of the type especially designed for foundry use. Mr. Clark personally in charge.

CLEVELAND OSBORN MFG. CO., CLEVELAND.—Molding machines in operation. Represented by H. R. Atwater, vice-president; E. S. Carman, chief engineer, and J. C. Alberts, E. J. Byerlein, E. T. Dodderidge, H. E. Deakins, E. W. Jacobi, F. T. Spikerman, sales engineers.

CLEVELAND PNEUMATIC TOOL CO., CLEVELAND.—Complete line of this company's products. Represented by H. S. Covey, general sales manager; Arthur Scott, superintendent; H. C. Newton, manager Chicago office; Charles Garner, manager Toronto office; Capt. F. H. Burr, manager Southern district; Guy Gregory, manager New York office; F. E. Schwarz, manager Philadelphia office.

CLIPPER BELT LACER CO., GRAND RAPIDS, MICH.—“Clipper” belt-lacing machines, belt hooks and pins, photographs illustrating various uses of “Clipper” belt lacing and its adaptability to various conditions. Represented by Paul P. Rohns, secretary and sales manager, and P. E. Crother.

THOMAS E. COALE LUMBER CO., PHILADELPHIA.—Michigan soft cork white pine and California sugar pine in selected pattern stock. Represented by Thomas E. Coale, president; A. W. Anderson and E. C. Anderson.

COMBINED SUPPLY & EQUIPMENT CO., INC., BUF. FALO.—“Angle Stem” chaplets. Represented by S. LeViness, Jr., and C. L. Jackson.

CORN PRODUCTS REFINING CO., CHICAGO.—A core-binder known under trade name of “Kordek.” Represented by W. R. Cathcart, manager “Kordek” department, New York; J. A. Oates, Detroit; F. G. Faller, Jr., Buffalo; D. T. McGrory, Chicago; H. S. Karch, St. Louis.

DAVENPORT MACHINE & FOUNDRY CO., DAVENPORT, IOWA.—Foundry molding machines. Represented by Carl Falk, sales manager molding machinery department; Edward Whitaker, A. D. Ziebarth, A. V. Magnuson.

DAVIS-BOURNONVILLE CO., CHICAGO.—Exhibit demonstrating remarkable advances made in the use of machinery in oxy-acetylene cutting and welding. Several of its machines in operation, also a complete line of torches, regulators and tips. Represented by R. O. Mueller, salesman who covers Wisconsin territory; C. F. Williams, erecting engineer; A. C. Collins, manager St. Louis office; J. R. Wilson, manager Detroit office; Fred Maeurer, superintendent Chicago shop; H. Bird, Chicago office; W. R. Noxon, manager Chicago office.

DAYTON MOLDING MACHINE CO., DAYTON, OHIO (formerly E. H. Mumford Co., Elizabeth, N. J.)—Mumford patented molding machines, including jolt-rock-over draw machines in action, jolt-squeeze split pattern machines and jolt-squeezers. Represented by T. J. Mumford, 2nd, H. W. Sinclair, J. A. Walsh and G. W. Smith.

DEISTER CONCENTRATOR CO., FORT WAYNE, IND.—A laboratory-size Delster-Overstrom diagonal-deck table. Represented by B. J. Roberts, secretary and general manager.

DINGS MAGNETIC SEPARATOR CO., MILWAUKEE.—Magnetic separators with motor generators. Represented by R. A. Manegold, president and treasurer; E. S. Hirschberg, G. H. Fobian, R. Kretschmar.

JOSEPH DIXON CRUCIBLE CO., CHICAGO.—General line of graphite products. Represented by H. C. Sorenson, F. R. Brandon, W. B. Allen, D. A. Johnson, all of Chicago, and A. L. Haasis, George Neighbor and Malcolm MacNaughton from Eastern territories.

R. E. ELLIS ENGINEERING CO., CHICAGO.—Air-operated chucks, furnaces, drills, and other equipment. Exhibit in charge of R. E. Ellis, Fred Fisher, F. Alexander Ruger, R. A. Braunberger and C. D. Gordon.

ERWIN MFG. CO., MILWAUKEE.—Various styles of fire extinguishers and the company's “Firefoam” apparatus of 250, 500 and 800-gal. sizes, mounted on four-wheel trucks. Exhibit in charge of O. R. Erwin, president.

EAU CLAIRE SAND & GRAVEL CO., EAU CLAIRE, WIS.—Four grades of washed and screened bank sand for sand-blast foundry work. Represented by John Stewart.

FEDERAL MACHINERY SALES CO., CHICAGO.—Exhibit of machine tools. Represented by James L. Gough, H. L. Cole and Charles A. Odegard, secretary.

FOREIGN CRUCIBLES CORPORATION, LTD., NEW YORK.—Samples of French graphite crucibles. G. H. Ames.

FOUNDRY APPLIANCE CO., NEWARK, N. J.—The F. A. C. cope handling device for handling the cope and drawing patterns on power squeezers. Represented by J. N. Frantz and D. B. Diss.

FOUNDRY EQUIPMENT CO., CLEVELAND.—Photographs of Coleman core and mold-oven installations of past year. Represented by F. A. Coleman and C. A. Barnett.

FOUNDRYMEN'S SUPPLY CO., MILWAUKEE.—Exhibit in two booths, one demonstrating the Rapid molding machine, operated by a molder; samples of molding and core sand, also fire clay and silica wash. Mr. Holland, manager, assisted by representatives of the Albany Sand & Supply Co., and the Federal Malleable Co.

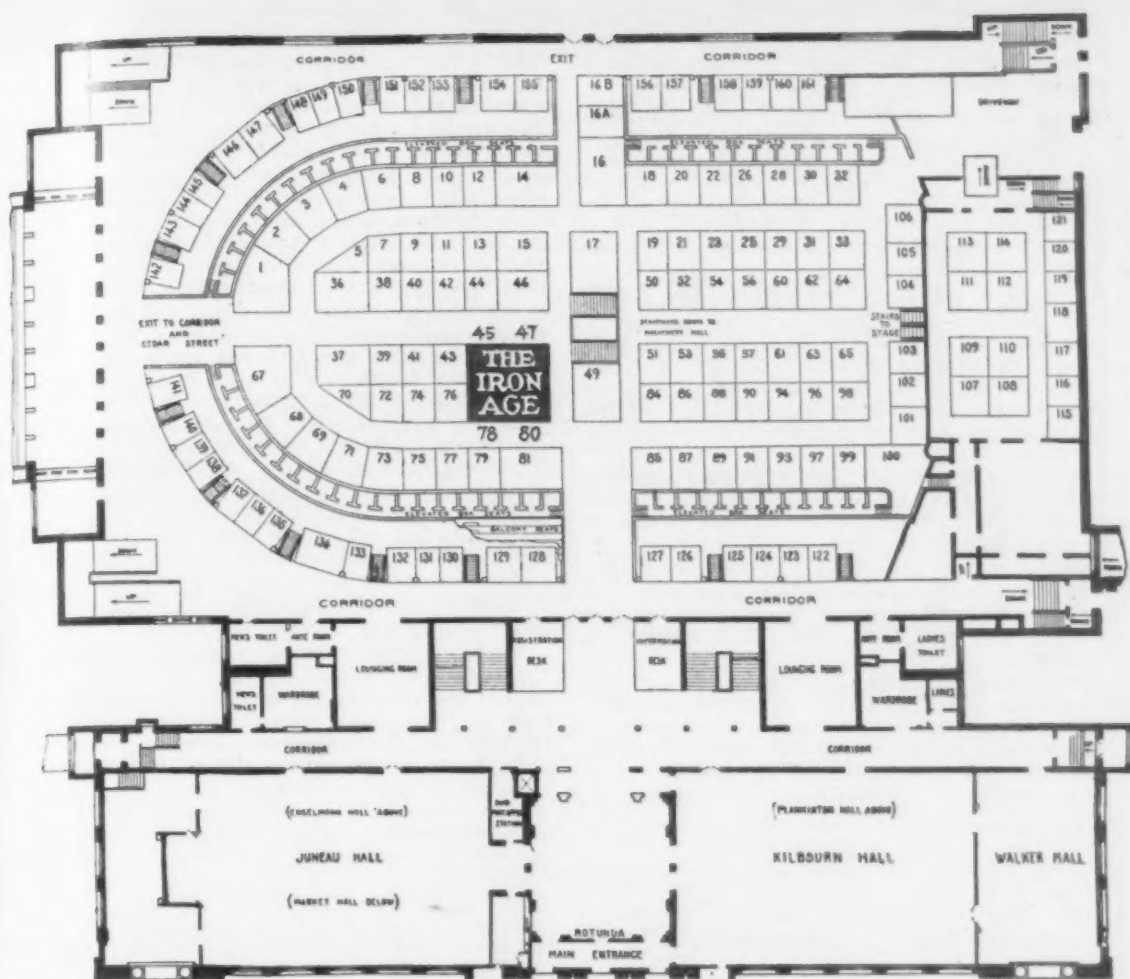
GARDEN CITY SAND CO., CHICAGO.—Samples of molding sand and core sand and fire brick. Represented by William Chambers, manager of foundry department.

GENERAL ELECTRIC CO., SCHENECTADY, N. Y.—Exhibit of enlarged photographs showing General Electric apparatus, and lantern slides to illustrate foundry applications products. Exhibit in charge of L. W. Shugg.

GENERAL STEEL CO., MILWAUKEE.—Exhibit of steel samples, microscopic photographs, photographs of company's mill and furnace equipment. Represented by E. Gruhl, vice-president; R. C. Gosrow, sales manager; E. V. Kane, sales department.

GORDON SAND CO., CONNEAUT, OHIO.—A rest room and a display of samples of various grades of molding sand for the production of aluminum, brass, gray and malleable iron castings. Represented by F. E. Gordon, Warner R. Thompson, W. E. Thompson and Taylor H. Boggis.

GREAT WESTERN MFG. CO., LEAVENWORTH, KAN.—Three types of gyratory foundry riddles and several re-



Plan of the Arena of the Milwaukee Auditorium and List and Location of Exhibitors

Allis Chalmers Mfg. Co. 107-110
 American Gum Products Co. 12 & 14
 American Kron Scale Co. 29
 Arcwell Co. 16A
 Asbury Graphite Mills. 102
 Austin Co. 106
 Barrett Co. 103
 B. Birkenstein & Sons 55
 G. S. Blodgett Co., Inc. 73
 Brass World Publishing Co. 61
 Frank D. Chase, Inc. 75
 Thomas E. Coale Lumber Co., 100 & 101
 Combined Supply & Equipment Co.,
 Inc. 26
 Corn Products Refining Co. 20 & 22
 Joseph Dixon Crucible Co. 51 & 53
 Eaculaire Sand & Gravel Co. 131
 Erwin Mfg. Co. 115
 Foreign Crucibles Corporation. 94
 Foundry Equipment Co. 79
 Garden City Sand Co. 56
 General Electric Co. 111-114
 General Steel Co. 89 & 91
 Gordon Sand Co. 105
 Philip Gross Hardware & Supply
 Co. 128, 9
 Hoevel Mfg. Co. —
 Holcomb Safety Garment Co. 97
 Holland Core Oil Co. 37

Illinois Clay Products Co. 95
 Industrial Electric Furnace Co. 117
 THE IRON AGE. 45, 47, 78, 80
 Jennison-Wright Co. 98
 Chas. Jurack Pattern Works. 96
 Chas. C. Kavin Co. 99
 Spencer Kellogg & Sons. 6
 T. P. Kelly & Co., Inc. 77
 Keokuk Electro-Metals Co. 130
 Julius King Optical Co. 63
 Laclede-Christy Clay Products Co. 71
 H. M. Lane Co. 119
 Loewenthal Co. 30
 David Lupton's Sons Co. 49
 McLain's System & McLain-Carter
 Furnace Co. 81
 Maclean Publishing Co. 60
 Marden, Orth. & Hastings Corp.,
 120 & 121
 Metal Industry 39
 Metal & Thermit Corporation. 34 & 86
 Monarch Engineering & Mfg. Co. 10
 New Chicago Crucible Co. 57
 New Era Mfg. Co. —
 S. Obermayer Co. 11, 13, 15, 42, 44, 46
 Pawling & Harnischfeger Co. 4
 J. W. Paxson Co. —
 Peck Iron & Steel Works 116
 Penton Publishing Co. 19-23, 50-54

George F. Pettinos 34
 Pickands, Brown & Co. 1 & 2
 Pittsburgh Furnace Co. 89 & 91
 Portage Silica Co. 104
 Progressive Metal & Refining Co. 25
 Quigley Furnace Specialties Co. 85 & 87
 Robeson Process Co. 88 & 90
 Rogers, Brown & Co. 17
 Shepard Electric Crane & Hoist
 Co. 70
 Sheriffs Mfg. Co. 118
 W. W. Sly Mfg. Co. 31, 33, 62, 64
 R. P. Smith & Sons Co. 65
 Werner G. Smith Co. 16
 Standard Conveyor Co. 133
 Standard Optical Co. 8
 Sterling Motor Truck Co. 66
 Sterling Wheelbarrow Co. 67 & 68
 Frederic B. Stevens 41
 W. F. Stodder. —
 Strong, Kennard & Nutt Co. 43
 Swan & Finch Co. 69
 United Compound Co. 38
 United States Graphite Co. 76
 United States Silica Co. 18
 P. H. Wheeler Mfg. Co. 82
 Whiting Foundry Equipment Co.,
 5, 7, 9, 36, 38, 40

movable bottom sieves. Represented by F. A. Pickett, secretary; George W. Combs, supt., and L. J. Griffiths.

GRIMES MOLDING MACHINE CO., DETROIT.—A small hot-roll-over machine, a hand-rammed roll-over machine and a small core machine. Represented by George L. Grimes, L. V. Grimes and C. J. Skeffington.

HAUCK MFG. CO., BROOKLYN.—Display of oil burner outfits for lighting cupolas, ladle heaters, mold dryers, pre-heating torches in connection with welding, kerosene torches and furnaces, oil fuel furnace burners, rivet-heating and annealing furnaces. Represented by A. Busch Hauck, H. E. Giersch, Willis C. Squire.

HAUSFELD CO., HARRISON, OHIO.—Exhibit of regular style open-flame furnace complete for gas and oil fuel; a regular style open-flame furnace with 10-in. opening in top and cover for same; a crucible furnace for gas and oil fuel; an aluminum furnace for gas and oil fuel; a ladle

heater; samples of refractory firebrick and cement and vibrators. Represented by Joseph E. Hausfeld, J. S. Armour and H. M. Statham.

HAYWARD CO., NEW YORK.—Working models of clam shell and orange peel buckets. Represented by C. F. Hutchings and H. M. Davison.

HERMAN PNEUMATIC MACHINE CO., PITTSBURGH.—A plain jarring machine that was part of a roll-over installation. This machine has a 40 x 50 in. table plate and a 13-in. cylinder. Represented by Thomas Kaveny, president; H. T. Fraunheim, treasurer; Robert F. Ringle, works manager; I. J. Irving, assistant works manager; R. P. Morgan, Robert Porteous, W. W. Hughes, C. S. McMath.

HOEVEL MFG. CORPORATION, NEW YORK.—Drawings and literature of sandblast machines. Represented by L. B. Passmore.

HOLCOMB SAFETY GARMENT CO., CHICAGO.—Ex-

hibit of a complete line of safety garments for the protection of workers in steel, iron, brass, etc. Represented by C. R. Holcomb, president, and A. F. Cutter, secretary.

HOLLAND CORE OIL CO., CHICAGO.—Exhibit of core oils, dry binders, parting compounds, and core wash. Represented by H. L. Baumgardner, president and general manager; Garrett W. Doty, superintendent manufacture and sale of dry core compound; James M. O'Hara, manager oils and chemicals; Harry Whiting, plant superintendent; R. E. Pickereil, office manager; Seth Vining, chemist; Sam Dykstra and A. G. Chambers, salesmen.

HYATT ROLLER BEARING CO., NEW YORK.—Demonstration of the application of Hyatt roller bearings to foundry equipment of all kinds. Represented by D. Gleisen, manager industrial bearings division; P. C. Gunion, advertising manager industrial bearings division; T. P. Cunningham, sales manager transmission department; E. E. Eby, sales manager general applications department; G. O. Helmsstaedter, manager Chicago district.

THE IMPERIAL BRASS MFG. CO., CHICAGO.—Welding, cutting, decarbonizing and lead burning equipment. Represented by W. S. Noyes, manager of the oxyacetylene department, and J. Schroeter, welding engineer.

INDUSTRIAL ELECTRIC FURNACE CO., CHICAGO.—Illustrations, data and literature showing advantages of electric furnaces for steel foundries. Represented by C. B. Fletcher, F. von Schlegell, W. B. Lewis, M. G. Carhart and George B. Cross.

INTERNATIONAL MOLDING MACHINE CO., CHICAGO.—Exhibit of various types of turn-over, jarring, squeezing and stripping plate molding machines. Represented by Edward A. Pridmore, president; W. W. Miller, vice-president; F. W. Hamel, M. J. Monahan and E. G. Borgnis.

JENNISON-WRIGHT CO., TOLEDO, OHIO.—Kreolite wood blocks for machine shops and foundry floors; also a collection of enlarged photographs showing Kreolite floors installations. Represented by F. E. Jennison, F. M. Enright, L. T. Ericson, R. R. Hone, J. A. Smith and H. M. Newton.

CHARLES JURACK PATTERN WORKS, MILWAUKEE.—An assorted lot of snap flasks. Represented by Charles G. Jurack.

CHARLES C. KAWIN CO., CHICAGO.—No products exhibited. Represented by Charles C. Kawin, president; J. F. Nellis, vice-president; Charles A. La Fever, vice-president; J. H. Hopp, secretary; James Jordan of Buffalo office, Canadian and Eastern representative, and William J. Mulcahy, secretary Western branch; A. M. Knight, representing the Dayton branch, and R. F. Mains, Chicago.

KEARNEY & TRECKER CO., MILWAUKEE.—Exhibit of vertical and plain milling machines under power and in operation. Represented by Theodore Trecker, president; E. J. Kearney, secretary and treasurer; J. A. Camm, sales manager; C. C. Bauschke, Cleveland representative; W. H. Allen, Chicago representative.

SPENCER KELOGG & SONS, INC., BUFFALO.—Display of various core oils, including a few new brands which the company has recently brought out. Represented by A. P. Mason, New York; J. N. Yaeger of Chicago, and E. G. Allen and U. L. Throm of Buffalo.

JULIUS KING OPTICAL CO., CHICAGO.—Display of its line of safety goggles, helmets and masks. Represented by J. J. Duffy, manager, and A. G. Larson, salesman.

KEMPSMITH MFG. CO., MILWAUKEE.—Two milling machines, motor driven, both machines on actual manufacturing operations. Represented by Paul E. Thomas, president; John Goetz, vice-president and works manager; Peter Lowe, sales manager; F. M. Butterfield, assistant sales manager; Charles Drewes, superintendent experimental work, and E. E. Leason, purchasing agent.

KEOKUK ELECTRO-METALS CO., KEOKUK, IOWA.—Represented by John Dillon, Chicago, secretary-treasurer.

LACLEDE-CHRISTY CLAY PRODUCTS CO., ST. LOUIS.—Display of several kinds of firebrick, sleeves, nozzles, tuyeres and various fire clays. Represented by John H. McKelvey, sales manager, and E. C. Little, Chicago.

H. M. LANE CO., DETROIT.—Photographs of plants erected by the company. Represented by H. M. Lane, A. O. Thomas, vice-president, and Benjamin Towlen, secretary.

LOEWENTHAL CO., CHICAGO.—Samples of yellow brass and composition ingots and remelted aluminum ingots with castings produced from these metals. Represented by Edward B. Friedlander, treasurer; Victor J. Loewenthal, vice-president; Joseph T. Yavitz, sales manager; Samuel Livingston, Harry Seidenberg, sales representatives, and A. O. Mason, Jr., metallurgist and manager smelting.

DAVID LUPTON'S SONS CO., PHILADELPHIA.—A complete line of products. Represented by Clarke P. Pond, sales manager; R. A. Sanborn, Chicago district manager, and Charles F. P. Buckwalter, assistant sales manager.

McLAIN-CARTER FURNACE CO., MILWAUKEE.—Display of open-hearth steel castings poured from metal made in the McLain-Carter oil-fired furnace. The two McLain-Carter furnaces in operation in a Milwaukee plant also made available for inspection by visitors. Represented by David McLain, Frank Carter, Fred Smith, I. V. Scanlan.

McLAIN'S SYSTEM, INC., MILWAUKEE.—Display of samples of semi-steel castings of light sections, such as automobile cylinders and other castings containing 20 to 30 per cent steel. Also projectiles, containing 20 to 30 per cent steel scrap. Represented by David McLain, I. V. Scanlan, Arthur Akey, Thomas McCarthy, Robert Moody.

MAGNETIC MFG. CO., MILWAUKEE.—Display of a foundry magnetic separator arranged with an elevator; also a magnetic pulley-type separator and a similar machine of larger size. Represented by Alvin Dings, Roswell H. Stearns and John P. Bethke.

MAHR MFG. CO., MINNEAPOLIS.—Exhibit of oil-burning foundry equipment. Represented by H. H. Warner, A. E. Stenzel, C. M. Simonds, W. F. Bohnhoff.

MARDEN, ORTH & HASTINGS CORPORATION, NEW YORK.—Samples of Mohtan sand binders in liquid and powdered form and cores bound with these materials at various ratios and in comparison with cores bound with other materials. George N. Moore, H. M. Handy and J. M. O'Hara.

MARSHALL & HUSCHART MACHINERY CO., CHICAGO.—Booth only for desk room.

METAL & THERMIT CORPORATION, NEW YORK.—A large weld on a crankshaft made by the thermit process, as well as a complete line of carbon-free metals and alloys made by this company. Represented by Arthur F. Braid and H. C. Spillsbury, metallurgical engineers; J. G. McCarty and C. D. Young, representatives, and W. R. Hulbert.

MODERN TOOL CO., ERIE, PA.—Exhibit of an 8 x 18 in. self-contained plain grinding machine, etc. Represented by R. H. Wood, manager Chicago office; E. V. McConville, general sales manager, and C. E. McArthur, manager machinery department.

MONARCH ENGINEERING & MFG. CO., BALTIMORE.—Exhibit of Monarch furnaces and ovens, with special attention paid to the new 1918 model vertical type, tilting, non-crucible brass melting furnace. Represented by James J. Allen, Harry D. Harvey, Frank Maujean, William Rabor.

MONROE CALCULATING MACHINE CO., NEW YORK.—Represented by H. H. Doty, Chicago manager.

NAPIER SAW WORKS, INC., SPRINGFIELD, MASS.—Exhibit of Napier 10-in. capacity band saw machine; also hack saws, band saws and circular saws. Represented by J. H. Green, manager Chicago branch; B. L. Calkins, L. C. Howard, J. J. Prendergast.

NATIONAL ENGINEERING CO., CHICAGO.—No. 2 Simpson intensive foundry mixer, 6 ft. in diameter, in operation. Represented by H. S. Simpson, manager.

NEW CHICAGO CRUCIBLE CO., CHICAGO.—Exhibit of all kinds of graphite crucibles and graphite greases. Represented by Dr. Sherman Taylor, president; A. F. Hottinger, secretary-treasurer; H. J. Lucas, sales manager; L. C. Taylor, supt.; J. P. Foraker, J. G. Crowe and J. W. Mann.

WILLIAM H. NICHOLLS CO., INC., BROOKLYN.—Exhibit of both plain and combination jolt and powder squeezers. Represented by William H. Nicholls and H. P. Mackinnon.

NORMA CO. OF AMERICA, NEW YORK.—Exhibit of various types of bearings which this company manufactures and several types of machinery to which they have been applied. Exhibit in charge of E. A. Perkins, sales engineer.

NORTON CO., WORCESTER, MASS.—Two grinding machines in operation together with a complete display of Norton "Crystolon" and "Alundum" grinding wheels.

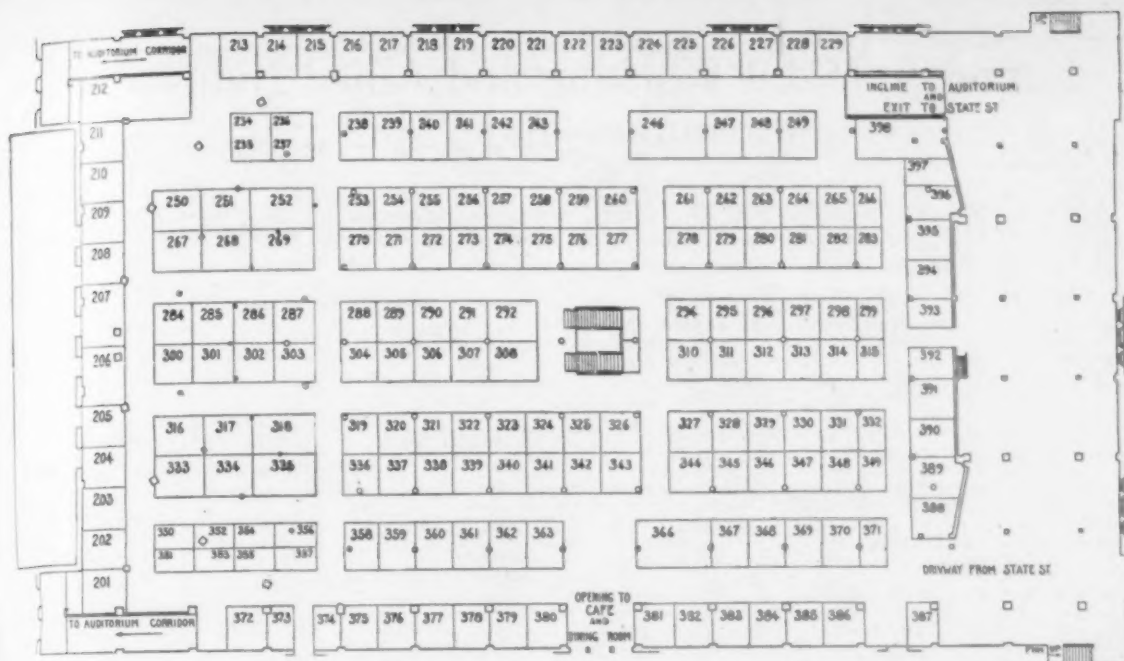
OLIVER MACHINERY CO., GRAND RAPIDS, MICH.—Exhibit of a universal wood milling machine of No. 102 type and one of No. 75 type, both in operation; also No. 60 universal saw bench, No. 34 vertical disk and spindle sander and a No. 51 alternating current speed lathe, this speed lathe being a new machine and exhibited for the first time.

ORDNANCE DEPARTMENT, UNITED STATES ARMY.—This Government exhibit of ordnance material and equipment. Exhibit in charge of the officers of the Ordnance Department.

OESTERLEIN MACHINE CO., CINCINNATI.—No machines on exhibition. Represented by Charles D. Oesterlein and George M. Meyncke, sales manager.

OXWELD ACETYLENE CO., CHICAGO.—A working exhibit of apparatus for welding and cutting metals by the Oxweld Acetylene Co. Exhibit in charge of A. B. Rosenthal, aided by George Rose, Carl Olson and E. D. Eddy, sales manager, J. N. Walker, C. E. Sonday, L. E. Ogden, Eastern sales manager.

PANGBORN CORPORATION, HAGERSTOWN, MD.—Exhibit of various types and sizes of sand-blast machines.



Plan of Machinery Hall of the Milwaukee Auditorium and List of Exhibitors and Their Location

Abell-Howe Co.	318	Foundry Appliance Co.	312	National Engineering Co.	246
Abrasive Co.	290	Foundrymen's Supply Co.	264	New Haven Sand Blast Co.	250
Acme Machine Tool Co.	368	Freeman Mfg. Co.	314	Wm. H. Nicholls Co., Inc. 281, 282, 283	
Air Reduction Sales Co.	—	James Gibbons.	337	Norma Co. of America.	306
American Molding Machine Co. . .	—	Great Western Mfg. Co.	257, 258	Norton Co.	301, 302, 303
Arco Mfg. Co. 253, 4, 5-270, 1, 2		Grimes Molding Machine Co. . .	310, 311	Oliver Machinery Co.	321, 2-338, 9
Arrow Forging & Tool Works.	395	Hauck Mfg. Co.	300	Oxweld Acetylene Co.	208-221, 2, 3
E. C. Atkins & Co., Inc.	381-382	Hausfeld Co.	252	Pangborn Corporation.	210, 211, 212
Badger Packard Machine Co.	369, 370	Haynes Stellite Co.	332	Peerless Machine Co.	336
Bastian Blessing Co.	385, 386	Hayward Co.	204, 205	Phoenix Mfg. Co.	331
Battle Creek Sand Sifter Co.	396	Herman Pneumatic Machine Co. .	286, 287	Henry E. Pridmore, Inc. 261, 2, 278, 9	
Berkshire Mfg. Co.	236, 237	Hoffmann & Billings Mfg. Co.	334	Racine Tool & Machine Co.	347
Bystone Mfg. Co.	291	Hyatt Roller Bearing Co.	358	Railway Mechanical Engineer.	390, 91, 92
Brown Specialty Machinery Co. 224-227		Imperial Brass Mfg. Co.	372	Richards-Wilcox Mfg. Co.	335
Buckeye Products Co.	263, 280	International Molding Machine Co. .	288, 289	Rivett Lathe & Grinder Co.	348, 349
Carborundum Co.	308	Kearney & Trecker Co.	323, 324	Rothacker Film Mfg. Co.	226, 229
Caulkins-Carpenter Co.	386	Kemp Smith Mfg. Co.	319, 320	Sand Mixing Machine Co. 213-220 inc.	
Central Electric Co.	206	Ludlum Electric Furnace Co.	333, 334	Schroeter Engineering Co.	373
Champion Foundry & Machine Co. 284		J. S. McCormick Co.	316, 317	Simonds Mfg. Co.	356, 357
Cincinnati Pulley Machin'y Co. 341, 2, 3		McCrosky Reamer Co.	363	Standard Sand & Machine Co.	203
C. J. Clark.	315	Macleod Co.	249	Sullivan Machinery Co.	397, 398
Cleveland Osborn Mfg. Co.	238-243	Magnetic Mfg. Co.	207	Tabor Mfg. Co.	247, 248
Cleveland Pneumatic Tool Co.	304, 305	Mahr Mfg. Co.	209	Thomas Elevator Co.	361
Clipper Belt Lacer Co.	307	Mail-o-meter Sales Co.	351	Torchweld Equipment Co.	388, 389
Davenport Machine & Foundry Co.	265, 266	Marshall & Huschart Mach'y Co.	367	U. S. Molding Machine Co. 259, 0, 276, 7	
Davis Bournonville Co. . . 378, 379, 380		Maxon Premix Burner Co.	285	Wadsworth Core Machine & Equip-	
Dayton Molding Machine Co.	267, 268	Alexander Milburn Co.	201	ment Co.	251
Deister Concentrator Co.	230, 231	Milwaukee Bag Co.	371	J. P. Wallace & Co.	269
Dings Magnetic Separator Co.	374, 5, 6	Modern Tool Co.	330	Walter H. Wangellin & Co.	352
Electric Furnace Co.	154, 155	Monroe Calculating Machine Co. .	256	Warner & Swasey Co.	325, 326
R. E. Ellis Engineering Co.	362	Mumford Molding Machine Co.	292	Western Electric Co.	353
Federal Foundry Supply Co.	273, 4, 5	Napier Saw Works.	340	E. J. Woodison Co.	294, 299 inc.
Federal Machinery Sales Co.	327, 8, 9-344, 5, 6			Young Bros. Co.	393, 394

Represented by Thomas W. Pangborn, president and general manager; John C. Pangborn, vice-president; H. D. Gates, sales manager; W. C. Lytle, assistant sales manager; H. F. Liedtke, engineer; F. J. Hull, assistant engineer, and P. J. Potter, A. L. Holmes, George A. Cooley, Charles T. Bird, district sales engineers.

PAWLING & HARNISCHFEGER CO., MILWAUKEE.—One $\frac{1}{2}$ -yd. Pawling & Harnischfeger single-line grab bucket crane and photographs. Represented by Nicolaas Prakken, sales engineer; A. G. Henricks, general manager; Ben Van Horn, sales manager; C. W. Goyette, traffic manager; A. W. Greetham, excavator sales manager; E. F. Zelsig, advertising manager.

PECK IRON & STEEL WORKS, KALAMAZOO, MICH.—Exhibit of patented press steel foundry flasks and steel slip jackets and bands. William W. Peck in charge.

GEORGE F. PETTINOS, PHILADELPHIA.—Samples of crude and domestic plumbago as well as finished products, and samples of molding sands and gravels. Represented by George F. Pettinos; H. B. Taylor, Jr., sales manager; L. B. Passmore, western manager.

PHOENIX MFG. CO., EAU CLAIRE, WIS.—Display of turret attachments for engine lathes; also photographs of these attachments in actual use in various munition and other manufacturing plants. Represented by I. B. Roland, Martin A. Hanson and W. L. Harrison, Cleveland office.

PICKANDS, BROWN & CO., CHICAGO.—A display of Solvay coke in the form of an army officer's tent at headquarters, the sides, front and back built of foundry sized coke and the roof of graduated strips of the several crushed sizes. The Semet-Solvay Co., Syracuse and Detroit, co-operates with Pickands, Brown & Co. in this exhibit. Pickands, Brown & Co. represented by George A. T. Long, operating metallurgist; Thomas W. Glasscot, salesman; Bayard T. Bacon, sales agent; James A. Galligan, sales agent. The Semet-Solvay Co. represented by William H. Ball, coal and coke agent; James A. Ballard, sales manager.

PORTAGE SILICA CO., YOUNGSTOWN, OHIO.—Photographs of company's plant and samples of silica rock in its natural state. Represented by E. E. Klooz, vice-president and general manager, and L. R. Farrell, secretary.

HENRY E. PRIDMORE, CHICAGO.—Exhibit of various foundry machines. Represented by Mrs. Henry E. Pridmore, president and treasurer; Henry A. Pridmore, vice-president and secretary; Marshall E. Pridmore; D. F. Egan, representative; C. H. Ellis, representative; J. W. Dopp of the J. W. Dopp & Co., Detroit, representative; Hugh Gallagher, representative; Harry G. Schlichter, superintendent.

PROGRESSIVE METAL & REFINING CO., MILWAUKEE.—Metals manufactured by this company, such as bronze ingots, brass ingots, aluminum, brick copper, white metals and virgin metals such as Lake copper, spelter, aluminum, antimony and tin, and all non-ferrous metals on display.

Foundry, Metal Working and Allied Industries in Milwaukee and Vicinity

The following list gives alphabetically the names, addresses, products, telephone number and by the numeral the location on the accompanying map of the foundry, machine tool, metal working and allied industrial plants of Milwaukee and vicinity:

Acme Hydraulic Co., Twenty-sixth Ave., scrap baling presses, Orchard 193 9
 Allen-Bradley Co., 495 Clinton St., electrical controlling apparatus, Hanover 719 10
 Allis-Chalmers Mfg. Co., West Allis, turbines, pulverizers, engineers, etc., Hanover 3607 8
 American Metal Products Co., 671 Kinnickinnic Ave., Ampco bronze, Hanover, 1442 10
 Ampco Rolling Mills Corporation, 209 Grand Ave., bronze sheets, bars and wire, Grand 4161 6
 Badger Wire & Iron Works, Twenty-fifth Ave. and Cleveland St., metal lockers and wire work, Orchard 397 9
 Bayley Mfg. Co., 732 Greenbush Ave., fans and blowers, Hanover 3986.. 10
 Bucyrus Co., South Milwaukee, steam shovels, steel castings, etc., Toll.. 11
 J. C. Busch Co., 136 Ferry St., sand blast equipment, Hanover 957..... 10
 Chain Belt Co., 736 Park St., conveyors, Hanover 3000 10
 Cutler-Hammer Mfg. Co., Twelfth St. and St. Paul Ave., electrical apparatus, Grand 5220 6
 Davis Mfg. Co., Fifty-seventh and Mitchell sts., duplex milling machines, portable gas engines, etc., West Allis 410 8
 Dings Magnetic Separator Co., 671 Smith St., separators, Hanover 1010 10
 Doelger & Kirsten, 505 Cedar St., alligator shears, Grand 1899 6
 Durant Co., 655-665 Buffum St., counting machines, Lincoln 1352 3
 Falk Co., foot Thirtieth St., steel castings, West 4622 5
 Federal Malleable Co., 299-323 Sixty-fourth St., molding machines, West Allis 15 8
 Federal Pressed Steel Co., Keefe Avenue and N. Pierce St., pressed steel shapes, Lincoln 808 3
 Filer & Stowell Co., 219 Becher St., shafting and pulleys, engines, Hanover 214 10
 Geuder, Paeschke & Frey Co., St. Paul Ave. and Fifteenth St., metal stampings, etc., Grand 170 6
 Hell Co., Twenty-sixth and Montana avs., tank work, conveyors and structural shapes, Orchard 990.. 9
 Holt Electric Co., 377-379 So. Pierce St., motors and dynamos, Hanover 519 10
 Inglis Mfg. Co., 283-285 Fifth Ave., oil storage and circulation systems, Hanover 175 10
 Chas. Jurack Pattern Co., 199-201 Oregon St., patterns, Hanover 461. 10
 Kearney & Trecker Co., West Allis, milling machines, West Allis 344. 8
 Kempsmith Mfg. Co., Forty-fifth and Rogers sts., milling machines, West Allis 300 8
 Kickhoefer Mfg. Co., 199-201 Oregon St., Hanover 102 10
 Krahn Mfg. Co., 588-598 Clinton St., forced feed lubricators, Hanover 3673 10
 Lutter & Gies, 258 Lake St., machinery and tools, Hanover 351 10
 Logemann Brothers, 3130 Burleigh St., presses, hydraulic, bundling, Kilbourn 314 2
 Magnetic Mfg. Co., 601 Enterprise Bldg., electric vibrators, Grand 816 6
 McLain-Carter Furnace Co., Inc., 9808 Goldsmith Bldg., coke saving system, Main 2184 7
 Maynard Electric Steel Casting Co., 716 Reed St., electric steel castings, Hanover 514 10
 Mechanical Appliance Co., 133 Stewart St., motors, Hanover 2511 10
 Metal Stamping & Mfg. Co., Fifteenth & Oklahoma aves., Hanover 417.. 10
 Milwaukee Boiler Co., 220 Oregon St., Hanover 721 10
 Milwaukee Die Casting Co., 297 Fourth St., die castings, Grand 1133.... 6

Milwaukee Electric Crane & Mfg. Co., Sixtieth St. and Greenfield Ave., West Allis 570 8
 Milwaukee Steel Foundry Co., 101-121 Water St., steel castings, Hanover 737 10
 Milwaukee Stamping Co., Sixty-fourth St. and Pullen Ave., West Allis 62 8
 Milwaukee Tank Works, 851 Kinnickinnic Ave., Hanover 1179 10
 Milwaukee Tool & Forge Co., 220 Becher St., chisels, hammers and lathe tools, Hanover 1410 10
 Modern Steel Castings Co., 1400 Thirty-third St., steel castings, Kilbourn 358 2
 National Brake & Electric Co., foot Bellevue Pl., air compressors, Lakeside 3200 4
 National Enameling & Stamping Co., 909 St. Paul Ave., galvanized sheets, etc., Grand 4105 6
 Nordberg Mfg. Co., Chicago St. and Oklahoma Ave., engines, Hanover 3070 10
 Northwestern Malleable Iron Co., 756 Park Ave., malleable iron, Hanover 25 10
 Nortmann - Duffke Foundry Co., Twenty-seventh St., castings, perforated metals, Orchard 616 9
 John Obenberger Forge Co., Fifty-third and Burnham sts., West Allis 514 8
 Patton Paint Co., 213 Lake St., metal protecting paints, Hanover 226 10
 Pawling & Harnischfeger Co., Thirty-eighth and National sts., electric traveling cranes, Orchard 3055... 9
 Pelton Steel Co., Chicago Road and Elliott Pl., steel castings, Hanover 4822 10
 Pressed Steel Tank Co., Greenfield Ave., steel tank work, West Allis 500 8
 Richardson-Phenix Co., 122-128 Reservoir Ave., lubricating devices for engine cylinders, Lincoln 923.... 3
 Rundle-Spence Mfg. Co., 63 Second St., combination fountain and cooler, Grand 322 6
 Sivy Steel Casting Co., Thirty-seventh Ave., steel castings, Orchard 1443 9
 A. O. Smith Co., Twenty-seventh St. and Keefe Ave., metal stampings, Kilbourn 640 2
 Smith Engineering Works, 1154 Thirty-second St., cut-off saws, Kilbourn 4100 2
 George H. Smith, 500 Clinton St., steel castings, Hanover 3993 10
 T. L. Smith Co., 1125 Thirty-second St., concrete mixers, Kilbourn 4100 2
 Standard Crucible Steel Casting Co., 719 Thirtieth St., crucible and open-hearth castings, Kilbourn 241 2
 Stegman Motor Car Co., 606 Linus Ave., motor trucks, Hanover 1024. 10
 Sterling Motor Truck Co., Forty-sixth and Roger sts., motor trucks, West Allis 56 8
 Sterling Wheelbarrow Co., Sixty-fourth St. & Pullen Ave., wheelbarrows and foundry flasks, West Allis 380 8
 Stowell Co., South Milwaukee, punchings and stampings, Toll 11
 Stroh Die Molded Casting Co., 161-171 Michigan St., Main 1871 7
 Titan Truck Co., 35 Twenty-fifth St., motor trucks, West 88 5
 W. Toefer & Sons Co., 80 Menominee St., perforated metals, Main 891.. 7
 Thomas Furnace Co., 740 Kinnickinnic Ave., low phosphorus pig iron, Hanover 390 10
 Universal Machinery Co., 784 Thirtieth St., machine tools, Kilbourn 2... 2
 E. R. Wagner Mfg. Co., North Milwaukee, stampings, No. Milwaukee 170 1
 Wisconsin Malleable Iron Co., South Bay, castings, Hanover 117 10
 Wrought Washer Mfg. Co., 46-54 So. Bay, Hanover 467 10

The following list is a geographical grouping according to the districts designated by the numerals on the accompanying map of the foundry, machine tool, metal working and allied industrial plants of Milwaukee and vicinity:

1
 E. R. Wagner Mfg. Co.
 2
 Logemann Brothers,
 Modern Steel Casting Co.
 A. O. Smith Co.
 Smith Engineering Works,
 T. L. Smith Co.
 Standard Crucible Steel Casting Co.
 Universal Machinery Co.
 3
 Durant Co.
 Federal Pressed Steel Co.
 Richardson-Phenix Co.
 4
 National Brake & Electric Co.
 5
 Falk Co.
 Titan Truck Co.
 6
 Ampco Rolling Mills Corporation.
 Cutler-Hammer Mfg. Co.
 Doelger & Kirsten.
 Geuder, Paeschke & Frey Co.
 Magnetic Mfg. Co.
 Milwaukee Die Casting Co.
 National Enameling & Stamping Co.
 Rundle-Spence Mfg. Co.
 7
 McLain-Carter Furnace Co.
 Stroh Die Molded Casting Co.
 W. Toefer & Sons Co.
 8
 Allis-Chalmers Mfg. Co.
 Davis Mfg. Co.
 Federal Malleable Co.
 Kearney & Trecker Co.
 Kempsmith Mfg. Co.
 Milwaukee Electric Crane & Mfg. Co.
 Milwaukee Stamping Co.
 John Obenberger Forge Co.
 Pressed Steel Tank Co.
 Sterling Motor Truck Co.
 Sterling Wheelbarrow Co.
 9
 Acme Hydraulic Co.
 Badger Wire & Iron Works.
 Heil Co.
 Nortmann-Duffke Foundry Co.
 Pawling & Harnischfeger Co.
 Sivy Steel Casting Co.
 10
 Allen-Bradley Co.
 American Metal Products Co.
 Bayley Mfg. Co.
 J. C. Busch Co.
 Chain Belt Co.
 Dings Magnetic Separator Co.
 Filer & Stowell Co.
 Holt Electric Co.
 Inglis Mfg. Co.
 Chas. Jurack Pattern Co.
 Kickhoefer Mfg. Co.
 Krahn Mfg. Co.
 Lutter & Gies
 Maynard Electric Steel Casting Co.
 Mechanical Appliance Co.
 Metal Stamping & Mfg. Co.
 Milwaukee Boiler Co.
 Milwaukee Steel Foundry Co.
 Milwaukee Tank Works.
 Milwaukee Tool & Forge Co.
 Nordberg Mfg. Co.
 Northwestern Malleable Iron Co.
 Patton Paint Co.
 Pelton Steel Co.
 George H. Smith.
 Stegman Motor Car Co.
 Thomas Furnace Co.
 Wisconsin Malleable Iron Co.
 Wrought Washer Mfg. Co.
 11
 Bucyrus Co.
 Stowell Co.



THE FOUNDRY AND METAL WORKING PLANTS OF THE MILWAUKEE TERRITORY
ARE SEGREGATED IN ELEVEN GROUPS

Represented by Sol Sadek, president; Max Sadek, vice-president; Michael Sadek, secretary and treasurer; Sam Sadek.

QUIGLEY FURNACE SPECIALTIES CO., NEW YORK.—Demonstration of the use of the "Hytempite" furnace cement, as well as a new insulating brick. Represented by W. S. Quigley, L. G. McPhee, W. C. Bell and R. A. Wirfs.

RACINE TOOL & MACHINE CO., RACINE, WIS.—Display of metal cutting machines. Represented by D. B. Maxwell, Chicago and Milwaukee representative; H. A. Schmidt, Eastern representative; A. H. Goetz, Pennsylvania representative; P. Graves, Canadian representative; E. R. Larson, Southern representative; Ralph Maxwell.

RICHARDS-WILCOX MFG. CO., AURORA, ILL.—Exhibit of "Over-way" carrying track equipment for conveying loads overhead in foundries and industrial plants; several sizes of this equipment shown with switches, curves, trolleys, hoists, etc. Represented by A. J. Eggleston and E. J. G. Phillips.

RIVETT LATHE & GRINDER CO., BOSTON.—Exhibit includes plain precision bench lathes, chasing bar lathe, back-gear precision lathe mounted on oak cabinet; internal grinders, radial grinder, full automatic radial grinder, improved Rivett thread tool. Exhibit in charge of A. F. Orcutt, vice-president and general manager.

ROBESON PROCESS CO., NEW YORK.—Exhibit of cores made with glutrin. Represented by T. J. Ryan and T. J. O'Hara.

ROGERS, BROWN & CO., CINCINNATI.—A display of castings demonstrating the vital part foundrymen are playing in the winning of the war. Represented by S. W. Hubbard, Thomas A. Wilson, J. C. Mears, A. O. Sonne, A. B. Weaver, F. W. Bauer, J. R. Morehead.

SHEPARD ELECTRIC CRANE & HOIST CO., MONTAUR FALLS, N. Y.—Photographic illustrations showing installations of Shepard cranes and hoists in foundries. Represented by W. B. Briggs, Chicago district manager; R. H. McGredy, sales manager; A. J. Barnes, advertising manager.

SIMONDS MFG. CO., FITCHBURG, MASS., AND CHICAGO.—Display of circular cutting-off metal saws; also hack saw blades and files, and demonstration of metal saw cutting steel bars. Represented by H. B. McDonald and J. W. McLean, Chicago sales manager.

W. W. SLY MFG. CO., CLEVELAND.—Exhibit of Sly horizontal sand blast mill of the booster gun type, complete with all necessary accessories. Represented by W. C. Sly, president; George J. Fanner, vice-president; P. W. Graue, Western representative; D. E. Hadley, Eastern representative; E. J. Moore, R. F. Smith.

R. P. SMITH & SONS CO., CHICAGO.—Exhibit of "Protec-Toe" safety shoes for molders and foundrymen. Exhibit in charge of J. B. Smith, Jr., vice-president.

WERNER, G. SMITH CO., CLEVELAND.—Exhibit of cores, core oils and castings. Represented by Werner G. Smith, president; Milton S. Finley, vice-president; A. L. Fay, Chicago manager; L. P. Robinson, Boston manager; W. E. Rayel, service expert; R. H. Mills, Portland manager; F. H. Dodge, manager foundry supply, and John Scheuer, factory manager.

SOUTHWORTH MACHINE CO., PORTLAND, ME.—Exhibit of one of its turret screw machines in the booth of the Federal Machinery Sales Co.

STANDARD OPTICAL CO., GENEVA, N. Y.—Exhibit of "Stoco" safety goggles. Represented by G. F. Dryburgh.

STANDARD SAND & MACHINE CO., CLEVELAND.—Standard batch mixer as a working exhibit. Represented by Harry E. Boughton and Paul E. Lacey.

STERLING WHEELBARROW CO., MILWAUKEE.—Display of a line of Sterling steel flasks; Sterling foundry barrows and some of the Sterling specialties, including wedges, skim gates and flask pins. Represented by I. R. Smith, general manager; H. H. Baker, sales manager; R. F. Jordan and J. M. Dickson, factory representatives; J. W. Dopp and J. A. Patterson, Detroit representatives; E. W. Dowd, New England representative; L. J. Salzman, Cleveland representative; C. L. Kirk, Pittsburgh representative; J. J. Coyne.

FREDERIC B. STEVENS, DETROIT.—Display of a line of Stevens' stamped steel ladle bowls and new style shanks, electric vibrators, a complete electro-plating plant in operation. Represented by James F. Hughes, Jr., Henry Krigner.

W. F. STODDER, SYRACUSE.—Cyclone suction sand blast nozzle, the feature of which is that work can be stopped at the nozzle without going to the sand tank to shut off the air. Represented by W. F. Stodder.

STRONG, KENNARD & NUTT CO., CLEVELAND.—Display of safety devices and first-aid supplies. Represented by B. W. Nutt, secretary.

SULLIVAN MACHINERY CO., CHICAGO.—Exhibit of a Sullivan angle compound belt driven air compressor with a rated capacity of 445 cu. ft. per min. against a pressure of 100 lb. per sq. in. Represented by Joseph H. Brown, Chicago, district sales manager; Howard T. Walsh, general

sales manager; H. F. Bernard, Chicago sales department; Alexander F. Milne, engineering department, Chicago factory, and S. B. King, advertising manager.

SWAN & FINCH CO., CHICAGO.—Core oil both "Atlas Century" and "Special A Corul" and cores made with its oil and lubricating greases, "Cupese" and "Sloflo." Represented by H. S. Chamberlin, manager core oil department; William Sharp, manager Chicago branch; J. A. Ellis, R. L. Babenroth, G. W. Hall, R. J. Kemp and Charles Howe.

THOMAS ELEVATOR CO., CHICAGO.—No. A-6 Warner & Swasey turret lathe equipment with a Barker wrenchless chuck. Represented by W. A. Barker, general manager; J. A. Wheeler, general superintendent; Harry Cadman, foreman, and J. J. Moore.

UNITED COMPOUND CO., BUFFALO.—Exhibit of Buffalo brand vent wax and Buffalo brand pattern wax; also samples of cores vented with the company's vent wax. Represented by J. W. Bradley, general manager, and W. F. Bradley, assistant manager.

UNITED STATES GRAPHITE CO., SAGINAW, MICH.—Exhibit of a variety of foundry facings and graphite ore. Booth in charge of the following: James J. Drought, Chicago sales manager; E. S. Brownfield, St. Louis sales manager; C. H. Schenck, Northern sales manager; George D. Robinson, Buffalo representative, and M. J. Houlihan, sales manager.

UNITED STATES MOLDING MACHINE CO., CLEVELAND.—Exhibit of plain air squeezer and other foundry machines being in operation. Represented by J. N. Battenfeld, president; J. L. Battenfeld, sales manager; C. F. Battenfeld and R. W. Gramling.

UNITED STATES SILICA CO., CHICAGO.—Samples of Flint shot, sand blast abrasive, and Flint silica, a steel molding and core sand, together with samples of castings which have been sand blasted with Flint shot. Represented by A. Volney Foster, president; H. F. Goebig and Oliver Cook.

VULCAN ENGINEERING SALES CO., CHICAGO.—The Mumford Molding Machine Co., represented by Vulcan Engineering Sales Co., exhibits a Mumford 10-in. high trunnion squeezer. Represented by J. T. Lee, sales manager; O. F. Weiss, E. P. Pittfield and J. O. Clark.

WADSWORTH CORE MACHINE & EQUIPMENT CO., AKRON, OHIO.—The company's new Navy type core making machine, core cutting-off and coning machine, all-steel reinforced core plates and bottom plates. Represented by G. H. Wadsworth, president and general manager, and M. C. Sammons, secretary.

J. D. WALLACE & CO., CHICAGO.—Wallace bench planer and Wallace bench saw. Exhibit in charge of J. D. Wallace and H. L. Ramsay, sales manager.

WARNER & SWASEY CO., CLEVELAND.—No. 2A universal hollow hexagon turret lathe working on bar work and No. 4 universal working on chucking work. Represented by A. C. Cook, sales manager; H. E. Witham, manager Chicago office; C. E. Neubert, Chicago.

WESTERN ELECTRIC CO., NEW YORK.—Display of flood lights for both short-throw and long-range lighting. Represented by Will J. Davis, Jr., and Milwaukee representatives.

F. H. WHEELER MFG. CO., CHICAGO.—Exhibit of Wheeler protective wearing apparel such as asbestos fireproofed duck and leather leggings, gloves, mittens, spats, helmets, coats, pants, etc. Represented by F. H. Wheeler, president, and E. L. Wheeler, secretary.

WHITING FOUNDRY EQUIPMENT CO., HARVEY, ILL.—Type A tumbler, one section of a drawer type core oven, one geared ladle, a foundry truck, plain top turntable, and an air hoist. Represented by R. H. Bourne, vice-president and sales manager; N. S. Lawrence, assistant sales manager; A. H. McDougall, chief engineer, and S. T. Sjoborg, assistant chief engineer, and G. R. Braden, P. A. Dratz and G. Schirmer, Chicago representatives.

E. J. WOODISON CO., DETROIT.—Exhibit made up largely of Morrison electric jar ram rollover draw pattern machine, the Woodison-Webb air squeezer, Woodison-Swan core machine for automobile cylinder cores and such work, etc. Represented by E. J. Woodison, president; C. H. Woodison, vice-president; J. C. Woodison, secretary; C. D. Yahne, treasurer; W. J. Wark, Buffalo; U. W. Frink, Boston; M. A. Bell, St. Louis; W. F. Haggman, Seattle; R. S. Hoffman, Cleveland; G. A. Burman, J. F. Webb, William Maybank, W. H. Muir, A. F. Jordan, W. W. Bowring, M. M. Werckman, F. F. Shortsleeves, J. M. Witters, H. S. Taylor, D. D. Baxter, salesmen.

YOUNG BROTHERS CO., DETROIT.—Exhibit of an oven, showing the company's new panel construction, four methods of heating. Represented by George A. Young, secretary and treasurer; R. B. Reed, sales manager; C. C. Bradford, sales representative; G. G. Parry, sales engineer; H. L. Ritts.

The following announcements of exhibits were received too late for publication in the preceding alphabetical list of exhibits:

ALLIS-CHALMERS MFG. CO., MILWAUKEE.—Exhibit of hydraulic turbine governor; 6-in. centrifugal pump with 50-hp. motor; two water wheel runners; motor-driven compressor; steam turbine bladings and numerous photographs. Represented by Otto H. Falk, president; H. Woodland, treasurer; Max W. Babb, vice-president; C. E. Searl, C. E. Search, A. E. Harrison, H. A. Balding and A. P. Hauck, in charge of exhibit.

ELECTRIC FURNACE CO., ALLIANCE, OHIO.—Photographs of furnace installations and exhibits of various products produced by them, all of which are war materials. Represented by Charles L. Foster, sales manager; Dwight D. Miller, New York, and T. F. Baily.

MACLEOD CO., CINCINNATI.—Exhibit of torches, sand blast equipment, etc. Represented by A. G. Hauck.

MCCROSKY REAMER CO., MEADVILLE, PA.—Wizard quick change chuck and collets on a 24-in. Reed & Prentice upright drill, drilling various size holes in one piece and drilling and tapping operations; also new style Super adjustable reamers and Ideal types, and a full line of McCrosky turrets in all styles and sizes, and Wizard variable speed and reversing attachment and Searchlight universal lamp bracket for shop lighting. Represented by C. M. Sutton and M. J. Foulk.

TORCHWELD EQUIPMENT CO., CHICAGO.—Exhibit of oxy-acetylene welding and cutting equipment and supplies. Represented by C. J. Nyquist, president; W. A. Slack, secretary; Hal R. Fenstermaker, Wisconsin representative, and N. Havis, demonstrator.

Features of the Week's Meetings

At the joint session on Tuesday morning, Oct. 8, C. S. Koch of the cannon section, production division, Ordnance Department, will discuss the activities of that department, especially as applying to foundry matters, and Col. Martinon, head of the French Technical Mission, now touring the country, is to deliver an address on the "Production of Semi-Steel Shells in France." Major Edgar Allen Custer, Ordnance Department, Pittsburgh district, has prepared a paper on "Cast Iron in Service Projectiles and Trench Warfare" for the Thursday morning gray iron session of the American Foundrymen's Association. Another of the addresses for the opening joint session is to be made by E. D. Brigham, manager iron ore, coal and grain traffic, United States Railroad Administration, on "Co-operation Between the Railroad Administration and the Foundry Industry."

Among other papers may be mentioned one on "Women in the Foundry," by C. E. Knoeppel, C. E. Knoeppel & Co., New York, scheduled for the Wednesday morning session of the American Foundrymen's Association; one on "Problems of the Returned Soldier," by W. A. Janssen, Canadian Steel Foundries, Ltd., Montreal, scheduled for the Wednesday morning safety and accident prevention session; "Ordnance Steel for the Army and Navy," by John Howe Hall, Taylor-Wharton Iron & Steel Co., High Bridge, N. J., and "Meeting Specifications for Army Ordnance Steel Castings," by Capt. E. B. Swanson, inspection division Ordnance Department, Washington, the last two to be presented at the steel session on Thursday morning. One of the features of the meetings of the Institute of Metals Division of the American Institute of Mining Engineers is the symposium on the "Conservation of Tin," scheduled for Wednesday morning with some nine addresses on the subject.

Considerable emphasis is placed on the number of motion pictures which will be presented. Included are military films to be shown by Major Frank B. Gilbreth, Providence, R. I., on "Modern Methods for Transferring Skill," covering the assembling of the Browning gun and the use of hand grenades. A session Wednesday afternoon is set aside for motion pictures on concrete ships, civil re-establishment of crippled soldiers and submarine and torpedoes in action. In this connection it may be mentioned that one of the features of the exhibition will be a display of war equipment made under the auspices of the Ordnance Department.

At the banquet on Thursday evening Charles M. Schwab, director general United States Shipping Board Emergency Fleet Corporation; W. H. Blood, Jr., assistant to the president American International Shipbuilding Corporation, Philadelphia, and Major A. Radcliffe Dugmore, of the British forces, will be the speakers.

An extensive plant visitation program has been outlined and will be confined to Thursday and Friday, Oct. 10 and 11. The formal program provides for trips Thursday morning and afternoon and Friday morning and afternoon. They include one to the noteworthy shops of the Allis-Chalmers Mfg. Co., one of the largest engine and power plant equipment works in the world and to the works of the Wisconsin Gun Co.

The importance of the address to be delivered by Colonel Martinon, as mentioned above, on "How Semi-Steel Shells are Manufactured in France," is clear when it is stated that American foundrymen in the next 12 months are going to be called upon by the Government to produce more than 30,000,000 semi-steel projectiles. As the process of manufacture is practically unknown in this country, the address promises to be as valuable as it is timely. For several years semi-steel shells have been cast in French foundries, but the production today, it appears, is inadequate to meet the constantly growing requirements of the armies on the western front. The French process has been developed to a high state of perfection and in his address, Colonel Martinon will describe all details of manufacture, including methods of molding, core making, melting, testing, etc. Also he will be accompanied by a large number of ordnance engineers, technical experts and shop foremen, who constitute this mission.

The visit of this mission is the result of an agreement with the French minister of munitions and the chief ordnance officer of the American Expeditionary Forces, to have such missions from each country visit the other to secure the closest co-operation between the two countries in regard to their industrial facilities. In this manner it is possible to standardize certain details of manufacture to promote the development of new resources and otherwise to secure for each country the benefit of the technical improvements made by its ally.

Colonel Martinon, head of this mission, for several years was in charge of manufacture at the well-known munitions plant of Schneider et Cie., Le Creusot, Paris, France. Other members, including ordnance officers, technical experts, shop foremen, foundrymen, etc., include Capt. H. Guillemin, Lieuts. H. Dutlin and P. Berthier and M. Combier, engineers from le Société de Saint Chamond, Second Lieutenant Blanchart of the Puteaux Arsenal and M. Coqua, shop superintendent of the Puteaux Arsenal. The following foremen also are in the party: F. Feral, A. Cheutin, E. Ceuillier, J. Derueux, M. Dussart, J. C. Chopin, O. Montbrun, J. Artiaque, P. Foucault, J. Pujoo, V. Clariasse, H. Barreau, J. Basset, P. Brichant, F. Deanars, R. Heuzard, A. Lefranc and C. Michaud. M. Naundorf acts as interpreter for the members of the mission.

The following committee appointed by Maj. Gen. C. C. Williams, chief of ordnance, is co-operating with the members of this mission and has arranged for the most effective utilization of its time while in this country: Lieut.-Col. James L. Walsh, president; Lieut.-Col. Albert W. Erdman; Major A. B. Hubbard; Major C. J. Browne; Capt. P. E. Landolt; Capt. George Knowlton, secretary.

The War Service Committee of the Ball Bearing Industry and Steel Ball Industry calls attention to the fact that the Priorities Division of the War Industries Board's circular No. 19 has placed manufacturers of ball bearings and steel balls on the preference list with the rating of class B-3, conditioned upon their executing and filling pledges of co-operation with and observance of the rules of the Priorities Division.

PIPE USES LIMITED

Regulations of Building Materials Section of War Industries Board

WASHINGTON, Oct. 1.—The Building Materials Section of the War Industries Board expects to effect a saving of 40,000 tons of pig iron and steel through new regulations governing the use of wrought pipe, cast iron pipe, tanks and accessories to be placed in Government projects under way and under consideration.

"The regulations and conditions will be enforced by the Government even though they may conflict with municipal ordinance, codes or local building regulations in the communities where the Government is building," says Chairman Baruch of the War Industries Board. "The only departure authorized is where the size or type of the structure makes changes necessary, in which case special application shall be made to and the approval secured of the Building Materials Section. The regulations will not preclude the use of existing manufactured stocks provided the metal cannot be utilized for more essential war purposes."

The regulations were adopted at a meeting of the Building Materials Section, of which Richard L. Humphrey is chief, with representatives of the Army and Navy, the United States Housing Corporation, the Supervising Architect's Office of the Treasury Department, the Railroad Administration, and the Priorities, Conservation and Steel Divisions of the War Industries Board. The following are the regulations

1. Nothing larger than 4-in. diameter nor heavier than standard plain cast-iron soil pipe is to be used for vertical stacks above ground; the full size stack to be carried through the roof. Portland cement concrete or vitrified clay pipe shall be used for horizontal lines under ground.
2. There shall be no back vents used.
3. No house traps or fresh air vents shall be used.
4. Water service pipes shall be of $\frac{3}{4}$ -in. galvanized wrought steel or iron for single houses, and of proportionately larger size for larger buildings.
5. No patterns for soil pipe and fittings other than those listed in the schedule of the Conservation Section of the War Industries Board shall be used.
6. The installation of gas piping in houses will not be permitted where electricity is available for lighting purposes. This will not prohibit the installation of gas piping for heating and cooking purposes where the extreme extension of the distribution mains to the houses is less than 1000 ft.
7. No system of gas mains shall be installed in any project requiring an extension of more than 1000 feet from the existing source of supply without the special approval of the War Industries Board.
8. No metal pipe shall be used for water mains without special permission of the War Industries Board. This does not apply to pipe lines carrying pressures of more than 100 lb.
9. The number of fire hydrants shall be reduced to the absolute minimum necessary for adequate fire protection.
10. All water supply tanks shall be of other material than metal.
11. Culvert pipes shall be reinforced concrete, burned clay or other material than metal.
12. Cellar floor drainage shall be restricted to the use of underground drains which may be turned up to the floor level and finished with a screw plug connection.

The Conservation Division of the War Industries Board has also issued a schedule for manufacturers of electrical heating appliances which calls for discontinuance of the manufacture of the following electrical utensils and appliances

Carburetor heaters, hand wheel heaters, in-take heaters, manifold heaters, primer heaters, blankets, robes, cigar lighters, frying pans, plate warmers, curling irons, sauté pans, waffle irons, fluting irons, egg boilers, soup kettles, stew pans, corn poppers, hand driers, hosiery forms, peanut roasters, transfer irons, vaporizers, varnish sprayers, entree dishes, cigar lighters for automobile, book binding appliances, instantaneous water heaters, automobile foot warmers, fudge warmers, vegetable dishes and all sheffield plated ware.

The schedule also limits the styles and sizes of practically all other electrical apparatus of this kind. "All appliances that are to be eliminated, but which are now in the process of manufacture or are completed and in stock may be sold, but no more material for any of

these appliances to be purchased except to balance up stocks on hand, and their manufacture is to be discontinued entirely Dec. 31, 1918. In no case, is any manufacturer to add to the number of styles and sizes that he is now making. Many other appliances may still be manufactured under severe restrictions.

Curtiss Aeroplane & Motor Corporation Receives Government Order for 15,000 Airplanes

The Aircraft Board has closed a contract with the Curtiss Aeroplane & Motor Corporation, Buffalo, for the construction of 15,000 airplanes of the DeHaviland 9-A combat type and the U. S. bombing or battle plane type. There will be 7200 of each type, besides 1000 S. E. 5s and an order of "spares," or additional parts. Announcement of the award was made in Toledo Saturday last by John N. Willys, president of the Curtiss company, who is also head of the Willys-Overland, Inc., manufacturer of automobiles at Toledo, and it is stated that the new contract is the largest airplane order thus far awarded by the War Department. It requires that the company attain a production of 100 planes a day by March 1, 1919, provided the Government furnishes the necessary motors and other equipment and the Federal Government has made arrangements assuring the Curtiss company an adequate amount of the supplies necessary for making these machines. All of the planes are to be built at the Buffalo plants of the company and it is stated that 8000 additional employees will be taken on at the company's six factories in that city between now and March 1.

The DeHaviland 9-A plane is a speedy and high-powered two-seated machine for fighting and bombing, equipped with the 12-cylinder Liberty motor. It has been in use for some time and has increased in favor with the airmen as well as with all military authorities who have anything to do with the aerial program. The U. S. B. battle plane is also a two-seater bombing and fighting plane, equipped with 300-hp. Hispano-Suize motors, and is a machine that has met with success enough to warrant its being manufactured in quantity. The S. E. 5s are single-seated fighting planes equipped with 180-hp. Hispano-Suize motors.

The total production of airplanes in France and England last year was 21,000.

Mexico's New Department of Commerce

WASHINGTON, Oct. 1.—The Latin-American Division of the Bureau of Foreign and Domestic Commerce has prepared a survey of the new Department of Commerce of the Republic of Mexico. This will be of particular interest to all American firms who wish to do business with Mexico.

The full name of the new institution is "Department of Industry, Commerce and Labor, of the Mexican Government at Mexico City." Its address is la General Jesus Carranza, num. 12, Mexico D. F. It is under the direction of Alberto J. Pani, an engineer by profession, who has been well known in the reconstruction work which the Constitutionalist Government of Mexico has been carrying out since the restoration of order began in 1914. Mr. Pani was formerly manager of the Mexican State railway system, and plans to make the department a strong force for the rehabilitation of Mexico's business.

The department is organized into four sections, those of internal commerce, external commerce, insurance and publications and statistics.

A list of Mexican chambers of commerce which have complied in all details with the law of 1908, regarding the formation and functions of such bodies, and may be considered to have a semi-official character, and also a list of certain other chambers of commerce, enumerated in the Boletín de Comercio, the organ of the Mexican Department of Commerce, as not of official character, can be obtained from the Bureau of Foreign and Domestic Commerce or its district or co-operative offices by referring to file No. 9272. It is believed that these chambers of commerce will be useful sources of information to American business interests.



Rapid Construction of New Steel Foundry

Structure 100 x 600 Ft. Containing 41,725
Sq. Ft. of Steel Sash Completed Within
60 Days--Field Operations Cover 45 Days

WAR-TIME pressure has afforded many examples of building construction in remarkably short time. A fact as interesting, if not more so, is that the structures, erected as quickly as they have been, contain no slap-dash work, but are permanent and attractive in appearance, are designed in accordance with approved practice and will be good for many years to come. It is not so long ago that some undertakings in plant construction, commonplace since the beginning of the war, would have been impossible. It is true that great buildings were occasionally quickly built, but they were not fireproof, for they were largely of wood; nor did they have the strength and rigidity combined with maximum light and ventilation which characterize buildings now built in record time. To the assembly of materials which have been manufactured elsewhere, to unit assembly, as well as to other improved methods of construction, to structural steel, reinforced concrete, steel sash, modern roofings and floorings is due the factory-building achievements of to-day.

Two illustrations herewith are views of a 100 x 600-ft. structure which was erected quickly to accommodate war work, but meets every demand of the modern foundry. They are interior and exterior views of the new foundry of the Hubbard Steel Foundry Co., East Chicago, Ind., which is to be devoted to the production of steel castings up to 500 lb. It adjoins the old plant of the company which manufactures chilled sand and steel rolls, machine-molded gears, rolling mill machinery and iron and steel castings. About 80 per cent of the company's contracts at this writing consist of war work.

The new plant has a main bay accommodating two 10-ton overhead cranes with a span of 60 ft. and a leanto approximately 35 ft. in width. The panels are 20 ft. each, and the height from floor to peak of roof is 45 ft. Its equipment for supplying metal consists at present of an 8-ton open-hearth furnace and a standard 3-ton Snyder electric furnace made by the Industrial Furnace Co., Chicago.

The building was designed, furnished and erected by and under the supervision of the Northwestern Bridge & Iron Co., Milwaukee, Wis., working with the T. W. Price Engineering Co., New York, which had supervision of the layout, pur-

chase and installation of the equipment. The general contract was awarded to the Milwaukee company Feb. 25, 1918, it being specified that the building was to be completed within ninety calendar days from the date of the contract. It actually was completed April 25. The time spent in the field was 45 days, not including six days lost on account of inclement weather. Joseph J. Simandl of the Northwestern Bridge & Iron Co. was in charge of the field work. Active operations began in the engineering and drafting departments the day following the letting, and in the field, March 5. The fabrication of structural steel was begun within one week of the letting.

In the construction of the foundations there was poured 500 cu. yd. of concrete, and piers were ready for the structural steel in 20 days. The erection of the steel began March 25 and was completed in two weeks. After the building of about 100 ft. of the structure, all of the remaining branches of the work were in progress. The walls consist of an 8-in. brick wall, 8 ft. in height and above this Fenestra steel sash, the latter supplied by the Detroit Steel Products Co., Detroit, and erected by the Fenestra Construction Co., Milwaukee. The brick walls contain 130,000 brick. Of the steel sash there is 41,725 sq. ft. and 2600 lin. ft. of mechanically operated sections built as an integral part of the sash, all ventilating sash being operated from the floor. The design of the building provides for the roof tier of windows acting as a sort of chimney for smoke and gases, while the side-wall vents allow for an influx of fresh air.

The roofing consists of 2-in. sheathing, 150,000 ft. b.m. of 2 x 6-in. matched and dressed lumber being required. It was laid at the rate of 20,000 to 25,000 sq. ft. per day by the South Side Roofing Co., Milwaukee, under a sub-contract. Over the sheathing was placed a composition roofing. The lumber requirements, also other building material, was supplied by the Wisconsin Lumber & Coal Co., East Chicago, Ind. The cranes were furnished by the Milwaukee Electric Crane Co., Milwaukee.

Vice Consul Richard P. Momsen at Rio de Janeiro, has reported that by a special decree the President of Brazil has authorized the American Steel Export Co.'s Brazilian corporation to operate in that country.

Would Prepare for Peace in Time of War

Senator Weeks Introduces Resolution to Appoint Committee on Reconstruction—Secretary Redfield Disapproves Discussion at the Present Time—Action May Be Delayed

WASHINGTON, Oct. 1.—Senator Weeks of Massachusetts has introduced a resolution calling for the appointment of the Congressional Committee on Reconstruction. This committee, according to the Senator's resolution, is to work out the great problems which the end of the war will bring with it. So far this important task has not been touched by official Washington. Various administrative bodies have done work which may later on be of value in any serious consideration of it, but there has been no effort to co-ordinate these minor attempts.

Observers in Washington who have watched the economic progress of the war look upon this problem as one most vital to our future. No one knows just why there has been no effort by the Administration to meet it. Secretary Redfield of the Department of Commerce has declared that he deprecates the discussion of any such problem at this time; that it involves unforeseeable contingencies and that its present treatment might take our mind off the war.

Col. E. M. House has been gathering some data which may be of value at the time of the peace conference in treating economic problems. Chairman Hurley of the United States Shipping Board has also gathered figures of this kind, but only with reference to the shipping problems of peace. The Bureau of Foreign and Domestic Commerce, in its daily routine, has compiled reams of such statistics, but because of the attitude of Secretary Redfield no effort has been made to collate them for real application to the problem of reconstruction.

But beyond that there has been no effort in Washington to work out a program of reconstruction or to meet the problems which the end of the war will bring. Just as we were unprepared for war, we are now unprepared for peace.

Because of this attitude of official Washington there seems little likelihood of prompt action on Senator Weeks' resolution. Members of Congress, in cloakroom discussions, have admitted the importance of this question, but in the face of apparent Administration opposition, have been timid about pressing it.

The committee to be named under Senator Weeks' resolution would consist of six members of each house. Three Republicans and three Democrats are to be picked from each body by their respective caucuses.

Many Subjects Involved

The committee is to have full power of investigation and is to report to Congress from time to time with recommendations for legislation. The program which the resolution sets out for the committee activities is an exceedingly comprehensive one. It specifies the following items:

1. Problems affecting labor, including: (a) Unemployment which may follow war; (b) utilization of discharged soldiers and sailors in civil employments; (c) conciliation and arbitration of labor disputes; (d) the relation of men and women in similar employments; (e) substitution of female employees for male and vice versa; (f) feasibility of organizing permanent employment agencies; (g) requirements for labor after the war, both in agricultural and industrial occupations; (h) distribution of labor; (i) employment of surplus labor on public works of which the construction or completion has been suspended due to the war.
2. Problems affecting capital and credit, including: (a) All matters relating to trusts and combinations; (b) Federal loans to private enterprises; (c) Federal supervision of capital issues.
3. Problems affecting public utilities, including: (a) The establishment of a railroad policy after the war, and the relation of the Interstate Commerce Commission to the railroads; (b) all questions relating to communication by wire.
4. Problems resulting from the demobilization of our industrial and military war resources, including: (a) The dis-

posal of surplus Government properties and supplies in this country and abroad; (b) the conversion of munition industries into those of peace; (c) the demobilization of the war strength of the Army and Navy and the disposition of the men who have been in the service; (d) the demobilization of civil war workers.

5. Problems affecting our foreign trade, including: (a) The development of new markets; (b) combinations for the purpose of increasing our selling facilities; (c) changes in our banking facilities necessary to co-operate with such trade.

6. Problems affecting the continuance of existing industries and the establishment of new industries, including: (a) The supply and control of raw materials; (b) the encouragement of the production in the United States of articles that have not been made in this country heretofore; (c) the encouragement of private enterprise in the development of the resources of the public domain; (d) the utilization of a tariff on imports as a means to protect and encourage home industries.

7. Problems relating to agriculture, including: (a) The advisability of continuing after the war price fixing of food products; (b) federal loans to farmers; (c) distribution of food products; (d) the allotment of lands to returned soldiers and sailors and their establishment in new homes on the public domain.

8. Problems relating to shipping, including shipyards, and especially in regard to the sale, continuance of ownership, or leasing of both yards and ships.

9. Problems affecting the adequate production and effective distribution of coal, gasoline and other fuels.

10. Housing conditions and the disposition of houses constructed by the Government during the war.

11. War legislation now on the statute books, with reference to its repeal, extension or amendment.

12. And in general all matters, necessarily arising during the change from the activities of war to the pursuits of peace, including those that may be referred to it by the Senate or House of Representatives.

Senator Weeks' Explanation

In presenting the resolution Senator Weeks called attention to the lack of war preparation.

"The failure of our preparation," he said, "not only delayed our active participation in the war, but it has and will cost us tens of thousands of additional lives and hundreds of millions, indeed billions, of dollars. The actual material with which we have had to supply ourselves since the spring of 1917 will cost many billions more than it would have if it had been provided in pre-war times.

"While the end of this great conflict may not be in sight, we hope it is, and we know now what the end will be. When it does come, it will not give us any time for preparation; indeed, in one day the whole world scene will change. Unless we take advantage of the present to provide for the future, we shall be caught in exactly the same condition as regards peace as we were when we declared war—unprepared. It will be infinitely more reprehensible if we fail to make preparations for peace, because we shall have lost our opportunity to take advantage of the great lessons we have learned from this war. There might have been some excuse from the viewpoint of many people for not making ample preparations to fight, but with that failure before our eyes, the example of the failures of other nations, and, more important, the provisions these nations are making for peace, there is no excuse for our country not preparing itself to meet the great after-war problems. Every nation now engaged in war has been and is now getting ready for peace conditions. Nearly three years ago conferences were held by the Allies at which certain principles were adopted in regard to trade conditions after the war, the relationship of one power to another, the relationship of the allied nations to friendly countries, neutral nations, and the enemy governments. Similar conferences were held by the central powers. Quite likely the conclusions reached

at that time may have to be modified, but these conferences indicate the farsightedness of European governments and the tendency on the part of the other nations engaged in the war to do those things which every one must recognize as absolutely essential.

Plans of Other Nations

"Since early in 1916, in addition to these international conferences, the various belligerent nations have been investigating and studying every conceivable question relating to after-war conditions, their relation to the social and industrial life of the country, and have at least tentatively adopted plans for carrying out the policies required by the new era we must face. This is especially true—and the evidence is at hand—in the case of Great Britain and, to some degree, Germany. In these countries the investigations have advanced to such an extent that separate ministries have been established to assume charge of the necessary reconstruction. In Germany, if the evidence I have is correct, three such ministries have been organized and one has been created in England. I do not believe an identical course can be followed to the best advantage in this country—at least, we should reach it through gradual stages—but we must without delay take such steps as may be necessary to provide for the innumerable new problems we must face the day peace is made.

"When that day comes—it will be a day, not a week, or a month, or a year—and peace is declared, Great Britain will be ready to act promptly in inaugurating policies to provide for the readjustment of its domestic and national affairs. The United States is remaining absolutely idle as far as these important subjects are concerned, and unless we act, and act promptly, we shall lose a great part of the commercial trade advantages we have obtained during the war, especially in its early days, and we will have much confusion which it will take a long time to overcome."

New Blank for Blast Furnaces

The following new blank is being sent to blast furnace operators to be filled out every week and returned to the War Industries Board:

WEEKLY REPORT OF BLAST FURNACES

Week Ending....., 191

(To War Industries Board, J. L. Replogle, Director of Steel Supply)

Name of operator.....Location.....
Number of stacks.....Stacks in blast.....
Capacity, all furnaces operating full under good conditions
.....tons per week. Pig iron produced last week.....
gross tons.

THE PURPOSE OF THIS FORM IS TO SECURE INFORMATION WHICH
WILL ENABLE US TO ASSIST YOU TO MAINTAIN

YOUR FULL PRODUCTION

To do this we must have complete detailed information relative to all the causes which are cutting down your output. This means that you must give us ALL the data, as a simple statement of cause, without facts which make it possible for us to correct the trouble, is of no use.

1—If your trouble is with raw materials, state whether ore, coal, coke or limestone, and if coal, what kind and for what purposes.

2—If your trouble is with labor shortage, etc., give details.

3—Please state if you produce your own ore, coal, coke or limestone, or receive from shippers, and whether by-product or bee-hive coke.

4—If your trouble is insufficient quantities of raw materials, or railroad delays on same, give names of shippers, routes, quantities, etc.

5—If your trouble is with quality of raw materials, give names of shippers, quantities, car numbers, dates of shipments and receipts, and in the case of fuel, the approximate details of ash, sulphur or other impurities.

Signature.....

This sheet must be filled out and mailed to Washington EACH MONDAY whether your output is decreased or not, reporting conditions for the week ending the previous Saturday night.

The Soc. Anon. Aurrera of Bilbao, Spain, has started to erect a blast furnace for the production of charcoal pig iron to mix with the coke pig iron obtained in the open market for turning out improved castings, especially machine parts and cast-iron pipes.

The Price Booklet and Other Documents

The numerous price changes announced by the Committee on Steel and Steel Products of the American Iron and Steel Institute, Sept. 26, and published in THE IRON AGE of that date, have been reprinted in pamphlet form in the same width of column as the booklet of the American Iron and Steel Institute recently issued, so that the new prices can easily be pasted on the blank pages provided in the booklet.

Owing to the tremendous demand for the various documents recently announced by THE IRON AGE, a supply of some of them has been almost entirely exhausted and some modification in the offers to readers has become necessary. The documents are now offered on the following terms:

A—New Price Booklet

The American Iron and Steel Institute's new edition of its booklet on maximum prices on iron and steel products as agreed upon by Government officials and committees of the institute, together with prices, extras and differentials recommended by its Committee on Steel and Steel Products. The booklet will be sent postpaid by THE IRON AGE or the American Iron and Steel Institute on the following terms: One copy, 50 cents; 12 copies, \$5; 100 copies, \$35.

B—Supplement for Price Booklet

Reprint of price changes published in THE IRON AGE of Sept. 12. These should be pasted on blank pages of the new booklet. Sent postpaid for 6c. per copy.

C—Priority Rules Pamphlet

Pamphlet giving rules governing priority in production issued by the Priorities Division of the War Industries Board—circular No. 4, superseding all previous rules and regulations—with some supplementary matter on priorities. Will be sent postpaid for 6c. per copy.

D—Supplement to Priority Pamphlet

Reprint of articles published in THE IRON AGE of Sept. 12, giving preference list of industries issued by the War Industries Board. Also procedure for exemption of workers. Will be sent for 3c. per copy.

E—Second Supplement to Price Booklet

Reprint of price changes published in THE IRON AGE of Sept. 26 to be pasted on blank pages of the booklet. Will be sent postpaid at 6c. per copy.

The Whitman & Barnes Mfg. Co., Akron, Ohio, has inaugurated a pension system for its employees, assuming all expenses in connection with the administration. The system operates along the usual lines of age and continuous service, with pension limits between \$20 and \$100 a month. One feature of the system is that after a pensioner dies, the company pays the pension to the widow so long as she remains unmarried.

Electric Cast Steel and Forged Shoes in South African Mining

An account of the first electric furnace installation in South Africa appeared in THE IRON AGE Feb. 7, 1918, an abstract of a paper presented before the South African Institute of Electrical Engineers by Prof. W. Buchanan and G. H. Stanley. A discussion of this paper later, as offered by J. M. Dixon, gave the following particulars about the locally-made shoes, produced by the electric furnace, and the dies used on the Robinson Deep by the Robinson Gold Mining Co.

Of the total number of shoes supplied 53.1 per cent broke at the shank. A very large percentage had holes of varying sizes and depths in the face and extending up the body, while differences of from 10 to 40 lb. in weight of shoes of similar dimensions were observed. Five shoes broke while being picked up by the stamp, giving no life at all, and 20 per cent of those which broke did so in the first 24 hrs. of use. These results confirm some experiments made some 12 years back at the Simmer and Jack, with imported cast-steel shoes, the conclusion then reached being that a cast shoe would not stand up to the work.

Imported cast shoes are now being used on that mine, and so far of 55 installed 10.9 per cent have broken at the shank, although they have not been running long. Of imported forged shoes used on the same plant during the past 12 months 3.5 per cent have broken. The local dies supplied have been quite a success; a number have broken, but the average life is slightly better than that of the imported. The following is a comparison of life and breakages of local and imported shoes and dies of equal weights:

Shoes:	Local	Imported
Number used	190	600
Average life (days).....	23	46
Number broken	101	21
Percentage broken	53.1	3.5
Life of broken (days).....	11	8
Life of unbroken (days).....	37	46
Dies:		
Number used	150	600
Average life (days).....	67	64

The grouping of the results in periods will show that no progress has been made in improving the shoes; in fact, the earliest consignment were better than the last received.

	No. Used	Av. Life Days	Broken	
			No.	Per Cent
January—March, 1917	45	30	15	33
April—July, 1917	30	23	14	46
August—November, 1917	70	22	42	60
December, 1917—March, 1918.....	45	18	30	66

The committee appointed to investigate the manufacture of these articles stated in their report that "by forging a very satisfactory product should be made," but the necessary reheating furnace and steam hammer were not included in the plant laid down.

During 1913, with a view to placing a contract for forged shoes and dies, trial lots were obtained from four leading makers, and the results are given below. The average weight of stamps was about 1550 lb. and the duty 15 to 16 tons. The shoes were 15 x 9 in. and the weight 287 lb.

Maker	No. Used	Av. Life Days	No. Broken	Per Cent
A.....	65	68	18	20.3
B.....	75	64	16	21.0
C.....	80	66	4	5.0
D.....	75	67	14	18.7

Another speaker, E. M. Weston, stated that the life of the shanks could be improved by reinforcing them with steel or wrought-iron rods—that is, by casting around them.

A. B. Inglis supplied the following particulars about the locally-made electric smelted shoes and dies. The period under review covered from January, 1917, to February, 1918.

	Shoes	Dies
Total number used.....	305	205
Average weight	237.5 lb.	132.75 lb.
Average running time.....	56 days	81 days

A second electric furnace is now being erected at the Robinson Deep mine on the Rand, where the existing plant is turning out 70 or 80 tons of shoes and dies

per month, meeting about 10 per cent of the requirements of the mines. When the second furnace is installed, it is expected that there will be a regular output of 100 tons per month. An advantage of this extension will be that there will be no necessity to cease operations when a furnace has to be relined. Since it is impossible to import electrical material for a new furnace, odds and ends have to be collected from mining places.

New Essington Works Exceed Schedule by 50 Per Cent

The shipyards of our country, which at the present time are working at utmost speed in fulfilling the Government's tremendous ship-building program, are in a large part entirely dependent upon the manufacturers, who produce the necessary machinery that goes into these ships. These manufacturing establishments are more than doing what is demanded of them as establishments for winning the war, and are filling the Government's orders in splendid manner. This war-time spirit has more than been demonstrated by the Essington works of the Westinghouse Electric & Mfg. Co., in South Philadelphia. Their records for the month of August were not only larger than the shipment for any similar time since the works commenced operations, but was 50 per cent in excess of the schedule. These works have concentrated their efforts upon the construction of ship propulsion machinery, such as steam turbines, mechanical reduction gears, condensers, pumps and other auxiliary steam apparatus, all of which comprise the Westinghouse marine power system. Up to Sept. 1, the company has shipped to the Submarine Boat Corporation, Newark, N. J., a complete equipment of ship propelling apparatus for eight vessels, and 20 complete sets of line shafting. An entire steam power equipment for two vessels, with six complete sets of line shafting, has been furnished to the Merchant Shipbuilding Co. of Harrisman, Pa. To the Newburgh Shipbuilding Co. of Newburgh, N. J., have been furnished two complete sets of line shafts, and to the United States navy yard at Norfolk, Va., two complete sets of turbines and reduction gears for a revenue cutter and two sets of reduction gears for destroyers. A keen spirit of friendly rivalry exists among the employees of the various departments of the Essington works. This serves the plant by speeding up the production of the different departments. Every one seems to realize that in carrying out the Government's shipbuilding program he is doing work of the most vital importance.

Alien Females Excluded

WASHINGTON, Oct. 1.—The Attorney General has issued an order fixing midnight, Oct. 5, 1918, as the time when the President's proclamation establishing a one-half mile prohibited area around Federal or State forts, camps, arsenals, aircraft stations, Government or naval vessels, navy yards, factories, or workshops for the manufacture of munitions of war or any products for the use of the Army or Navy, shall become effective as to German alien females. The effect of the act of the Attorney General in fixing this date is to make it unlawful for any German alien female 14 years of age and upward to be found within one-half mile of any of the places mentioned, except on public carriers, without a proper permit from the United States marshal.

The zinc ore producers of the Missouri, Kansas and Oklahoma mining district have, at a meeting held at Joplin, Mo., agreed to ask formally for an investigation by the Federal Trade Commission of the zinc smelting companies of the district and of the country as a whole. The mine operators base their request on the foundation that with spelter selling up to 9.50c. per pound zinc concentrate should bring more than \$52.50 per ton, basis of 60 per cent metal, and allege that this price is forced by united action of the smelters. Ore prices have caused the closing down of a number of producing properties.

Modern Industrial Relations Department

Its Organization to Handle Relations Between Employer and Employees and the Functions of the Different Subdivisions

—BY E. C. GOULD*

THAT the problem of handling the relations between company and employee in a large organization requires a specially trained and organized staff is now universally conceded, but inasmuch as very few employers have taken up this subject and developed it in any well-planned or scientific way, one looking to find a correct criterion to follow will be disappointed, for there seems to be no two organizations developed along uniform methods. For the guidance of those who are interested in practical research as to the best methods of organization and the apportioning of specific functions to highly developed subdivisions of a general plan, the following outline has been prepared. It is not claimed that this outline is ideal, but it has been drawn up after extensive study of the most successful employment and welfare organizations of the present day.

The handling of employee relation problems should be the function of a special department which should come directly under the president or general head of the company, and this department should be managed by a special official who reports directly to the president. The functions of a modern industrial relations department are: 1—To engage, place, transfer and remove workmen, 2—To provide for the safety of employees, 3—To provide for the good health of employees, 4—To provide for the mental, physical and social welfare of employees, and 5—To provide health, accident, death and old-age insurance.

Each of these five divisions requires the supervision of an experienced executive who has the technical education and practical experience coupled with a pleasing personality to put it across. These five division heads should meet regularly in joint conference with the director of the department, and should also meet in regular conference at the meetings of the heads of all the other departments of the plant in order that thorough understanding and co-operation may be had from all sides.

Each of the five main divisions should be again divided into clearly defined units in order that no phase of the work will be neglected or favored. A tentative outline of the subdivisions follows:

I—LABOR SUPERVISION DEPARTMENT

A—Employment

- 1—Employment Office
Engages new employees
Rehires and transfers old employees
Studies the jobs in the plant and working conditions so as to place employees intelligently
- 2—Registration Office
Makes up the employment records of all employees engaged
Assigns check numbers and clock cards to new employees

B—Bureau of Labor

- 1—Labor clerks to keep daily records of the work and progress of employees in the various departments
- 2—Investigation of absentees at their homes to find out the reason for absence, and to offer help in case of sickness or death
- 3—Interviewing of all quitters and other employees who may be disgruntled or have labor troubles or complaints and to adjust same whenever possible, and to pass on all discharges with final authority

II—SAFETY DEPARTMENT

- 1—To provide safe working conditions
- 2—To teach and train men to follow safe methods of work
- 3—To investigate accidents and remove the causes whenever possible

- 4—To provide for policing the plant
- 5—To provide fire protection for the plant
- 6—To provide wash and change houses, lockers, etc., and care for their upkeep

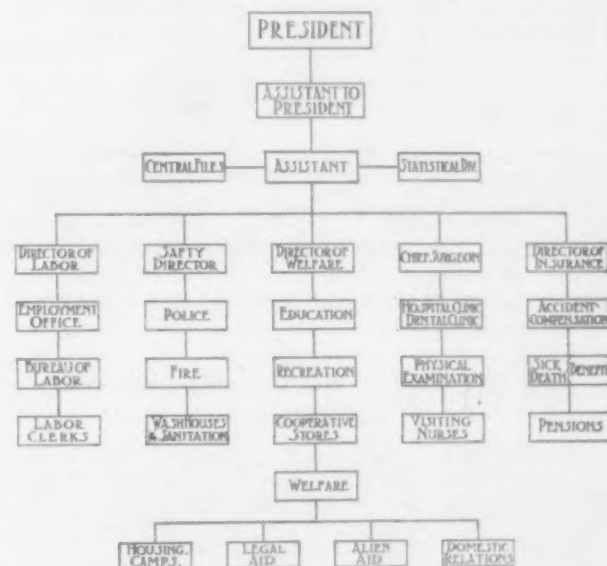
III—MEDICAL DEPARTMENT

- 1—First aid equipment and care of injured and sick
- 2—Physical examination of new employees
- 3—Follow-up of sick and injured employees
- 4—Visiting nurses to give aid in the homes of the sick and injured
- 5—Dental clinic service for employees
- 6—To see that pure water is provided, and that good sanitation is maintained in the shop and plant
- 7—To instruct employees in personal hygiene

IV—WELFARE DEPARTMENT

A—Education

- 1—To provide schooling for aliens
- 2—To provide technical courses of instruction to train employees for better positions
- 3—To provide a library for employees



Plan of a Functionalized Department of Industrial Relations

- 4—To publish a factory newspaper the aim of which is to develop an esprit de corps and to stimulate employees to develop themselves along the right lines
- 5—Suggestion committee to stimulate the giving of suggestions by employees and reward for same

B—Recreation

- 1—To organize sports and athletics for recreational purposes and to develop a factory spirit
- 2—To provide and maintain playgrounds where employees live in large neighborhoods
- 3—To organize and develop social amusements such as dances, corn roasts, picnics, field days, etc., for the benefit of the employees and their friends

C—Welfare

- 1—To help the employee solve his domestic and other personal troubles
- 2—To teach housekeeping and home hygiene in the homes of employees
- 3—To follow up the work of community agencies in order to protect the health, welfare and other interests of employees and their families
- 4—To give free legal aid and advice to employees and to help employees to get out of debt by securing the co-operation of creditors in preventing attachments and the pooling of payments, etc.
- 5—To aid aliens in raising their standards and methods of living, to advise and help them in securing citizenship papers and to aid in their Americanization

*Industrial engineer, Youngstown Sheet & Tube Co., Youngstown, Ohio.

- 6—To operate a housing bureau to secure houses and rooms for employees, and where company has houses to rent to supervise their renting, to work for civic improvement and betterment of housing conditions, where company has labor camps to supervise and look after same

D—Co-operative Stores

To organize and operate a co-operative store for the benefit of employees

V—INSURANCE DEPARTMENT

A—Accident Insurance

Claim department to handle accident cases and take care of State compensation for same

B—Insurance Benefits

Sickness and death benefits organized under one of the three following plans:

- 1—Supported entirely by the company
- 2—Supported jointly by the company and employee
- 3—Supported entirely by employee

C—Old Age and Service Pensions

Provide retirement pensions to employees for long and faithful service

The work of all the departments should be made a matter of complete record and to facilitate doing this a statistical department should be operated as a binder. This department would take care of all the reports and statistical records of all the departments, and a central filing system should be used for keeping records of employees. A tabulating machine could be used to great advantage in preparing detailed reports of the work and progress of the various branches of the work. Without adequate analytical records of the work done and results obtained, much time and money could easily be wasted on useless enterprises. Unless the services rendered to employees develop a loyal, contented working force and furnish proper incentives to stimulate wholehearted co-operation from the employee, they are wasted.

Some of the known results from the adoption of the foregoing plan either in part or entirely have been a reduction in working time lost, a reduction in labor turnover, the elimination of serious labor disputes, the development of esprit de corps, greater production, betterment of physical and social conditions of employees, a reduction of sickness and accidents, and the Americanization of aliens.

New Construction Authorized by the War Department

WASHINGTON, Oct. 1.—The Ordnance Department has secured authority from the War Department for additions to the plant of the Hero Mfg. Co., Philadelphia. The estimated cost of the facilities to speed up production on Ordnance Department contracts is \$150,000. This construction consists of three buildings 200 x 200 ft. of the type provided manufacturers in other cities under similar arrangements. In addition, there will be erected a temporary corrugated iron, steel frame boiler house 30 x 30 ft. The work will be done under the direction of the Construction Division.

Construction of additional accommodations for training coast artillery officers, enlisted specialists and chauffeurs at Fort Monroe, Va., in connection with the extension of the coast artillery training center, has been authorized. The cost of the work to be done under the supervision of the Construction Division is estimated at \$3,210,640.

Contract for 374 houses accommodating 400 families, public utilities and town planning at Davenport, Iowa, has been awarded to the Central Engineering Co., Davenport. The contract was let on fixed fee basis. A contract was also awarded to the Henry W. Herst Co., Rock Island, Ill., for 321 houses, utilities and town planning at Moline, East Moline and Rock Island. This contract was also let on fixed fee basis.

According to a report from Consul Lawrence P. Briggs, Rangoon, Burma, India., the Burma Mines, Ltd., is now erecting at Namtu, Northern Shan States, Burma, a mill for concentrating the lead, silver and zinc ores of these mines. The mill is being erected under the supervision of American engineers and mechanics, and American machinery is employed throughout.

NO LAWYERS NEEDED

Policy of War Industries Board—New Members of Priorities Committee

WASHINGTON, Oct. 1.—Chairman Baruch of the War Industries Board has again emphasized the purpose of the board to eliminate attorneys and agents wherever possible. He has again called attention to the bulletin issued by the War Industries Board warning business men against employing representatives who pretend to have an influence with the War Industries Board or any of its divisions.

"No attorneys or agents are needed," he said, in discussing this question, "by any one who has a question to present to this board. All men are on an equal footing here. All we are interested in is the justice of a man's request. We care nothing for his politics or his race or his religion. He does not need to have a lawyer to appear before us. In fact, I am somewhat prejudiced against lawyers. They always insist on quoting law to us. It isn't the law we are after. We know what the law is. What we want to get at is the facts and usually a business man can give us those much better than his lawyer can. As far as I have time to see individuals, I can be reached just as easily without an attorney or an agent as with one. In fact, the employment of an attorney is liable to arouse some suspicion on our part of the justice of the case that needs special pleading."

Chairman Baruch is still at work on a program for a greater use of the State councils of defense in lightening the labors of the War Industries Board. He hopes to work out a plan which will leave to these local authorities a greater share of the work that is now centered in Washington.

Chairman Baruch has announced the following appointments to membership on the Priorities Committee of the War Industries Board:

W. W. Chase, succeeding Charles P. Howland, specializing on Emergency Fleet work.

Percy Holbrook, acting also as a member of the Subcommittee on Rating.

J. M. Hopkins, handling export matters except those for the Allied Government having war missions and Japan.

Henry Krumb, handling textile materials, machinery and supplies, including cotton and woolen yarns and goods, hemp, flax, hemp rope, rubber and rubber goods, equipment and supplies for copper and non-ferrous mines and smelters.

Marcus B. Hall has been appointed assistant secretary of the Priorities Committee.

A. W. Clapp has been appointed Chief of the Labor Section of the Priorities Division of the War Industries Board and will assist Judge Edwin B. Parker in dealing with priorities in labor.

Rolling Railroad Wheel Centers

Léon Geuze, in a recent number of the *Revue de Métallurgie*, minutely describes the construction and operation of a German 5-roll mill. Dimensions of the wheel centers, tools, dies, etc., are calculated, and the inconveniences of the mill are pointed out. His conclusions are that a 1500-ton press is not powerful enough for the economical forging of blanks for wheel-centers exceeding 3½ in. in diameter. Nor is this form of mill suited to industrial conditions; it leaves too much to the skill and judgment of the workman. There are three sets of rolls to look after, and a false move is within the sphere of possibilities, considering that the total duration of the rolling cycle for each wheel-center is only 40 to 45 seconds. In order to obtain good results at a lower cost, the press used should be capable of forging the blank without roughing dies; and a simpler and more easily managed mill should be employed.

The Babcock-Davis Corporation, dealer in iron and steel products, is now located at 474 Dorchester Avenue, Boston.

FOLLOWING UP PLANT INJURIES*

Prompt First-hand Information a Requisite— How to Use the Bulletin Board

The keynote for the safety engineer, if he is to gain the permanent co-operation of officials and workmen, according to F. E. Morris, safety engineer, American Rolling Mill Co., Middletown, Ohio, is to create enthusiasm for the safety idea by personal acquaintance with each individual in the plant. Referring to the daily routine, he said:

Accident Reports

It is necessary that you get prompt first-hand information regarding the time, place and character of all of your accidents, whether minor or serious. At the American Rolling Mill Co. we do not ask the foreman to fill out a report of any kind when a man is hurt. We have about 1500 accident cases every month among about 5000 men, and you can imagine that it would take considerable valuable time to have the foreman write up 1500 reports. I don't think that the foremen's reports are of much value, and besides you will find that a worker won't be so ready to go to the hospital with a minor cut or bruise if he feels that his foreman may get peeved because he will be obliged to write out a report.

Some concerns have a form on which the foreman states that the safety rule was violated; we can't do that either, because we have no published rules except the one that I hold in my hand. On the back of this little identification disk you will find the following rule: "Before going to work ask the foreman for safety instructions." We have no rule book, for it seems to me that that one rule, in a plant where the foremen have the safety of their men at heart, is rule enough. On some of these forms is a line for "Discipline recommended." Put on the soft pedal when you talk of discipline. Don't make safety enemies by making your careless ones wear a dunce cap.

So we investigate the causes of all of our accidents and if the case is a serious one we even try to find out where the man was the night before. Does he drink? Is everything all right at home? Every other thing is sought that might have a bearing on the cause. It is best to investigate an accident with the foreman and his shop committee and let them take the action necessary. If the shop committee says, "Let's do so-and-so," isn't that much better than your posting a rule that the men in this department must do so-and-so? You cannot sell the safety idea if your workers suspect that you are backed up by a star and a club.

The investigation of accidents that have happened is one of your most important daily duties, but what is the best preventative? To my mind nothing gets results like shop meetings.

Keeping the Bulletin Board Alive

I believe, also, in posting our bulletins on stock boards. Vary the kind of matter you place on your bulletin boards, vary the boards themselves. Don't fool yourself into believing that the workers are going to come to them to see what you have put there—they steer shy of them as a rule.

Don't be satisfied to cover up a board with National Safety Council bulletins—no one but the most morbid will be attracted thereby; rather have one good picture in the center, and by putting it alone you add to its importance and the single lesson has a chance of sticking. A clipping from a newspaper describing an accident in some other plant will attract more attention than a regular bulletin, for men's curiosity is thereby aroused and men will fight to satisfy their curiosity, not to mention the ladies.

There are many workers who will pass by the most artful of bulletins. We try to reach these know-it-alls by small traveling boards we call our "daily." These are hung in inconspicuous places about the plant and they are changed every day. We've actually seen men

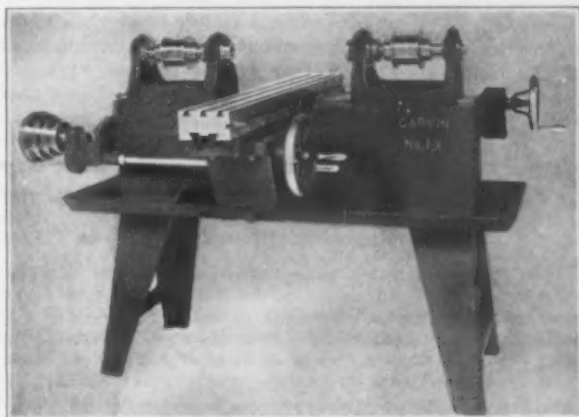
reading these on the sly—men who wouldn't be caught near a larger board.

Making Statistics Work

Just a word as to your statistics. I know of nothing better than the monthly summary that is sent out to the different departments. In the summary print the names of the foremen in whose gangs the accidents occurred. It is surprising how the foremen will strive to keep their names off of that report. It is well to have also a comparison with the months just preceding so that each department and the general management may see at a glance just how the safety idea is taking hold in the plant.

New Garvin Duplex Milling Machine

An addition has been made to the line of duplex milling machines made by the Garvin Machine Co., New York. It is provided with simultaneous wheel control to the spindle heads so that both heads may be moved at the one time. Provision is also made for



Duplex Milling Machine with Cutters Close to Spindle Ends and Both Heads Movable Simultaneously

independent head adjustment. The feed of the table is 34 in. while the distance between spindle heads is 22 in., this distance allowing the machine to handle pieces larger than the regular No. 1 Garvin machine.

The system of milling of this type of machines provides for parallelism of the work and it is found that the butt or face cutters give a notably fine finish to the work and can be fed at a good stiff feed, without sacrificing the finish. Two sides of the work are finished at the same time, and the cutters are close to the end of the spindles. Work can, of course, be stacked up and the same operation taken on all at once.

The machine is designed to meet the requirements of manufacturing of standard articles, such as hardware specialties, brass goods, typewriters, cash registers, etc.

Potash from Blast-Furnace Gas

E. H. Lewis of the Glasgow Iron & Steel Co. publishes the following particulars of the amount of potash charged into the company's blast furnace during the month of October, 1917, and the amount recovered:

Charged into furnaces	K_2O Per Cent	Lb. of K_2O per Ton of Pig Iron Produced	
Iron ores	0.13	5.16	= 8.12
Coal and coke	0.05	2.15	
Limestone	0.101	0.81	
<i>Recovered</i>			
Slag	0.146	1.63	= 8.12
Pitch	1.20	2.67	
Tube cleanings	2.23	0.07	
Dirt from washers	1.20	0.07	
Heavy dust from tubes	0.20	0.07	
Waste liquor	2.49	1.58	
Grains per Gal.			
Loss in running off slag and un- accounted for		2.10	

The Ordnance Department has announced that the total number of machine guns of all types accepted since the war began is 146,322; rifles, 2,437,297, and of pistols, 221,901.

*From a paper read before the convention of the National Safety Council at St. Louis, Sept. 17.

Midvale Plan of Employee Representation

Delegate for Each 300—About One-Tenth of These
Form Plant Committee—General Committee for
All Plants—Arbitration Provided if Necessary

The new basis of relations between employer and employee which the Midvale Steel & Ordnance Co. offered to establish for its employees and those of the Cambria Steel and subsidiary companies, as announced in *THE IRON AGE* of Sept. 26, has been the subject of employee meetings in the past week. A scheme of operation to provide for employee representation under the plan of collective bargaining between employer and employee has been drawn up and adopted by the different groups. A general outline of the plan is given below. Meanwhile the details of an employee organization at the works of the Lukens Steel Co., which, as also stated in the announcement in last week's issue, was offered to the Lukens employees, have not been completed. The Lukens idea is to adopt what is known as the Rockefeller plan in operation at the Pueblo works of the Colorado Fuel & Iron Co. to be molded to suit conditions at Coatesville. Meetings are being held every few days but it is felt that it will be a matter of two weeks before a decision as to methods will be reached.

The Midvale plan in outline is as follows:

Plan of Representation of Employees

For the convenient administration of this plan, each plant shall be divided into as many divisions as may be decided upon by the division representatives of each plant, on the basis of one representative for each 300 men. If any division shall have 150 men in excess of 300 (or multiple of 300) it shall be entitled to a representative for such fraction. In case the fraction is less than 150, it shall not be counted unless merged with a similar fraction from another division.

The above representation shall be based on the average number of employees of each division, as shown on the books of the company for the three months, October, November and December, preceding the election.

For the purpose of determining the proper representation of each division, the plant conference committee hereinafter constituted, shall have access to the records of the time offices of the plant.

Administration

Within a week from the date on which the division election committees announce the names of the elected division representatives, all of these representatives shall meet and elect from among their number a plant conference committee, consisting of one representative for each 3000 employees at the plant; with the proviso that, if, at any plant the number of employees in excess of 3000 (or any multiple thereof) is 1500, there shall be a representative elected for this fraction; and if the fraction is less than 1500, it shall not be counted; with the further proviso that no two members of the plant conference committee shall be selected from the same department of the plant.

Any employee having any grievance, or any matter on which he desires to have a decision, shall first present the subject to his immediate foreman or superintendent, in person or through his division representatives. If unable to secure a satisfactory adjustment, the aggrieved person, through his division representatives, shall present the matter in writing for consideration to the plant conference committee. If, in the judgment of this committee, the grievance is a just one, they shall present the matter in writing to the general superintendent of the works, who shall then confer with the plant conference committee, with the view of reaching a satisfactory settlement. The general superintendent shall have the privilege, if he so desires, of calling into this conference all of the division representatives.

If the general superintendent or his representative and a majority of the plant conference committee (or a majority of the division representatives in case they are called into the conference) are unable to agree upon any question at issue, the matter shall be referred to a committee consisting of the general superintendents of all of the plants of the company and all of the members of the plant conference committees of all plants of the company. This combination of plant conference committees together with the general superintendents shall be known as the general committee. On all propositions sub-

mitted to a vote by the general committee, the general superintendents shall jointly cast one vote for the company and the representatives of the employees shall jointly cast one vote for the employees. The president and other executive officers of the company shall have the privilege of appearing before the general committee. If this committee is unable to reach an agreement the matter shall be referred to arbitration.

One person shall be elected as arbitrator if the parties can agree upon his election; otherwise there shall be a board of three arbitrators, one member to be selected by the president of the company or his representative, one member to be selected by the employee members of the general committee; these two members, if unable to agree, to select a third arbitrator. The decision of the arbitrator or arbitrators in any matter submitted to him or them shall be final and binding upon both the company and the employees.

Rules Governing Employment and Discharge

The right of the company to hire and suspend or discharge men shall not be limited, except as expressly provided herein:

Any employee, guilty of any of the following offenses shall be subject to immediate discharge without notice:

(a) Disloyalty to the United States Government, by act or utterance;

(b) Any offense against the criminal law of the State;

(c) Assault upon, or attempt to injure, another person;

(d) Wanton destruction of property;

(e) Refusal to obey a reasonable order of his superior officer;

(f) Intoxication while on duty.

For offenses of a less serious character, such as—
Carelessness,

Failure to report for duty regularly and at the proper time,

Inefficiency, etc.,

It shall be the duty of the officers to secure efficiency by giving the offender at least one caution, which, if not heeded, may be followed by dismissal without further notice.

Any employee discharged for cause may demand that such cause be clearly stated to him, and shall have the right of appeal to the general superintendent either in person or through his elected representative.

General

No employee shall be compelled to purchase any article or service from the company, nor to subscribe to any fund, except such beneficial associations, as are already established or may hereafter, with the consent of the employees, be created. This shall not affect the duty of employees to account for tools or other supplies owned by the company and entrusted to their care.

Nothing in the foregoing shall prohibit the company from giving employees an opportunity to subscribe for the stock of the company, Liberty loans, Thrift stamps, etc., providing all such subscriptions are entirely voluntary on the part of the employee.

Nothing herein shall affect the right of the company to suspend work in any department because of lack of orders or for any other legitimate business reason. This may be done without notice, but it shall be the duty of the officers to give as much advance notice as practicable.

If any elected representative is appointed as a salaried foreman or superintendent, his position as representative shall thereby become vacant, and his successor shall be elected as provided.

Once every three months, at times and places mutually agreed upon by the president of the company and the conference committees of the plants, there shall be a combined meeting of all elected representatives with the officials of the company for the purpose of discussing all matters of general interest to both parties.

Election of Employee Representatives

The election of representatives of employees "to act on their behalf in all matters pertaining to conditions of employment, the adjustment of differences and all other matters affecting the relations of the employees to the company," is to take place annually on the second Monday of January each year. The plan

provides for a secret ballot for both nomination and election. An employee may nominate any fellow employee he desires as representative to the number to which his division is entitled. Persons to the number of twice as many representatives as the division is entitled to, receiving the highest number of nomination votes, are duly nominated candidates. An election committee of three for each division is selected by the plant conference committee and this committee is required to post signed notices announcing the names of nominees and the number who may be elected, the number of names being not more than twice the number of representatives to be elected. It is required that the notice shall be posted at least 48 hr. in advance of the election and the ballots are to be counted by the division election committee and the results posted with a notice signed by the committee.

Division representatives must be in the employment of the company at least one year in the aggregate. A re-election may be held if two-thirds of the employees of any division sign a petition that their elected representative has ceased to be satisfactory, and similar special elections may be held to fill vacancies.

Division representatives were elected at the various plants on Sept. 23 and these hold office until their successors are elected on Jan. 13.

Curtailling of Building

WASHINGTON, Oct. 1.—Building projects must be curtailed to save steel, coal and other important supplies as well as transportation and labor, according to the defense made by Chairman Baruch of the War Industries Board against the attack of Senator Calder of New York, who asked an investigation of the board's regulations.

"Iron and steel are a necessary part of every completed building," says Chairman Baruch. "They are necessary for plumbing, heating, ventilating, piping, hardware and mechanical equipment. The direct and indirect war needs of this country and of our Allies for the last six months of the current year already exceeds 21,000,000 tons and the country's total output for the first six months was less than 17,000,000 tons. The unavoidable result is that iron and steel cannot be used for non-war or less-essential purposes.

"It is clear that there is not enough iron, steel, transportation facilities, fuel and labor to supply the direct and indirect war needs of the country and the non-war needs also, and that the resources and facilities used in non-war and less-essential building projects can only be applied thereto by taking them from the war needs.

"It is not only the policy, it is the clear and simple duty of the War Industries Board to see that the war program of the country is met, and this program must be met now, when its needs are upon us. This duty must be fulfilled, even if its fulfillment entails industrial loss in this country, as it does human loss abroad."

The U. S. Community Labor Board has been organized in Youngstown, Ohio, with W. P. Barnum, former judge of common pleas court, chairman; R. C. Steese, formerly manager and vice-president and still a director of the Brier Hill Steel Co., representing the employers, and Ode J. Grubb, a business agent of the Journeymen Carpenters, representing labor. This board will decide what is essential work, and transfer men in non-essential and less essential employment, to more important undertakings as the circumstances may warrant. In several larger Ohio cities, the community labor boards have been performing valuable service. Judge W. P. Barnum, the most recent appointee on the board, was appointed by the war board at Columbus.

Witherbee, Sherman & Co., Inc., 2 Rector Street, New York, states that the rumor that it has purchased property between Albany and Troy, N. Y., for the purpose of erecting a blast furnace plant, is without the slightest foundation in fact.

Testing Aircrafts

WASHINGTON, Oct. 1.—One of the chief causes of the failure of the first year of our aircraft production lay in mistakes in inspection, according to the report made by the Senate investigating committee. The War Department has now issued the announcement of a complete change in methods of testing finished aircraft product.

By an agreement between the two divisions of the air service the acceptance parks or testing fields located at Dayton, Ohio; Detroit, Mich.; Buffalo, N. Y., and Elizabeth, N. J., have been transferred from the jurisdiction of the Bureau of Aircraft Production to the Division of Military Aeronautics.

Instead of flying each machine produced at least one hour before crating, as has been the practice, the fifteenth, twentieth or thirtieth plane, as may be decided, will be picked from the shop run, shipped direct to a testing squadron and given a tryout, or, to use the technical expression, "flown to destruction." The other planes will be immediately crated and sent on the way. As fast as the testing squadron develops a weakness in any machine the fault found will be flashed both to the factory and overseas and remedied before the plane takes the air.

"Thus," says the War Department's announcement, "with the factory inspection of parts and assembling maintained at a high mark and the flying tests stiffened, efficiency and accuracy of production has been increased and at the same time there has been a further reduction of time lost in the flow of engines and airplanes overseas.

Ferromanganese in Sweden

Ores suitable for the manufacture of ferromanganese are found at Spexeryd, Langbanshyttan, and Dalsland in Sweden, and ores from all those districts have been used in the manufacture of the alloy. Its manufacture began in October, 1914, at Trollhättan, and since then several other firms have taken up its production, including one at Trollhättan and one at Korfors—the latter on a small scale. A Stockholm company employs a Rennerfelt furnace in its production. The annual output of this alloy in Sweden in the four years 1914 to 1917 has been 300, 900, 500 and 1100 tons respectively.

The Chamber of Commerce of the United States has announced another series of important war service committees. It includes the following committee of manufacturers of fabricated steel: John Sterling Deans, Phoenix Bridge Co., Phoenixville, Pa.; Thomas Earle, Bethlehem Steel Bridge Corporation, Bethlehem, Pa.; Lewis D. Rights, L. F. Shoemaker & Co., Pottstown, Pa.; George P. Bard, Petroleum Iron Works Co., Sharon, Pa.; W. A. Garrigues, Levering & Garrigues, 552 West Twenty-third Street, New York; Howard A. Fitch, Kansas City Structural Steel Co., Kansas City, Mo.; E. A. Gilbert, Standard Boiler & Plate Iron Co., Niles, Ohio; J. L. Kimbrough, Indiana Bridge Co., Muncie, Ind.; G. D. Marshall, McClintic-Marshall Co., Pittsburgh; William S. Simpson, Jr., Christopher & Simpson, St. Louis; H. A. Wagner, Wisconsin Bridge & Iron Co., North Milwaukee, Wis.; Paul Willis, Kenwood Bridge Co., Chicago.

The Willys-Overland Co., Toledo, Ohio, is completing a new hotel which will be used for housing those of its employees who do not have families in that city. This is a two-story structure and the first unit, which is about completed, will provide accommodations for 250 men. The object of building a hotel was to provide modern, sanitary, convenient quarters at reasonable prices near the plant for unmarried men or new employees coming there from other cities until they find permanent quarters elsewhere. Accommodations will be provided at a flat charge of \$6 a week, including lodging, three meals a day and shower baths. The mess hall on the ground floor will accommodate more than 300 men at one time.

Sound Steel by Lateral Compression*

British Results from Applying This Principle to the Top Portion of the Slag—Cheap Refractory Top of Slag

BY BENJAMIN TALBOT

IN the presentation of this paper the author is continuing his work and investigation in the hope of producing a larger percentage of commercially sound steel from the upper portion of the ingot. The following description of the investigation may be of in-

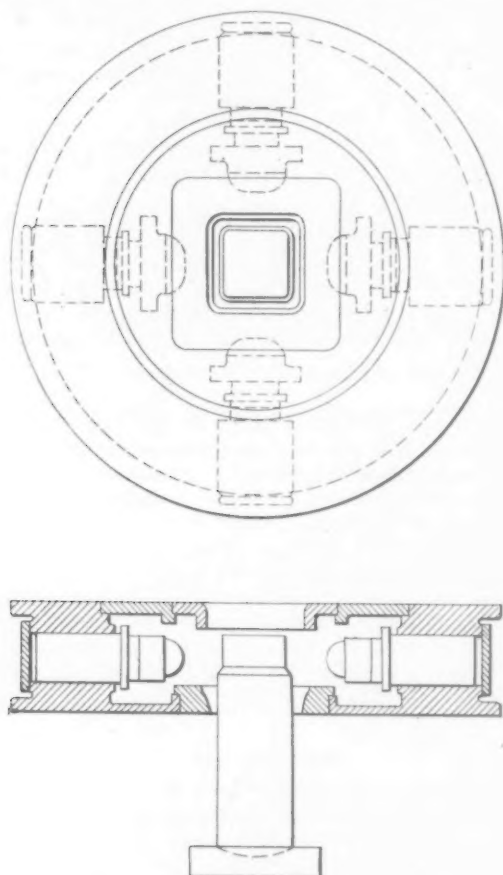


Fig. 1—Sections of the Hydraulic Press Used to Compress to Top Portion with Steel Ingots

terest to metallurgists and others upon this very important subject:

It was decided to use a refractory-lined top for the molds, as the use of these localizes the pipe in the ingot and also confines the segregation to the upper portion more than is the case when the iron molds are used. The refractory lined top also keeps the surface of this portion of the ingot hotter than the lower portion which is in contact with the iron sides of the mold. It was also decided to continue the investigation by laterally compressing the top portion only, as it was thought to be unnecessary to endeavor to improve the lower 80 per cent of the ingot, this being sufficiently sound and regular in composition for all ordinary purposes when refractory tops are made use of, and therefore the compression of the whole ingot would only make the proposed machine much larger and stronger than would otherwise be the case, and would also increase the time and cost of the compressing operation.

The Apparatus Used

The apparatus decided upon was a hydraulic press, so designed as to make a depression upon two or upon all the four sides of the ingot, and the depressions so

made were to be of larger area than the cavity which would form in the ingot were it allowed to go cold. This depression is made either oval or fluted in shape. Such a press is a compromise upon the Whitworth and Harmet methods. The idea of both these processes embraces the compression of the entire ingot in the mold itself, and consequently these molds have to be of a very strong structure to withstand the immense pressure exerted, and the time taken for the compression makes the process slow and very expensive. In the new method of pressing, the ingot is separated from the mold, and the upper portion is pressed at a time when the outer envelope is thick and strong enough to retain the pressure, but while the center is still sufficiently liquid.

The hydraulic press finally decided upon was designed and built upon the lines shown in Fig. 1. It will be observed that the press has four rams so placed that each face of the ingot can be operated upon as desired. It is furnished with a lifting table to take care of any difference in length of the ingot. To work the method successfully, care must be taken to have sufficient temperature on the surface of the top portion of the ingot which has to be squeezed, and therefore it is desirable to have a difference in temperature between the top portion of the ingot and the lower portion. In practical work we have found it best always to use an ingot of standard size, and hitherto ingots of $3\frac{1}{2}$ tons or 5 tons have always been used. All the ingot molds used in the investigation were furnished with refractory-lined tops.

The average temperature over a number of $3\frac{1}{2}$ -ton ingots when stripped between an hour and an hour and a half after casting was found to be 1140 deg. C. at the top in contact with the bricked portion of the mold, and 940 deg. C. at the bottom where it has been in contact with the iron side of the mold. With a difference of temperature such as is here indicated, and at the temperature given, the ingot is sufficiently hot to be pressed at the top.

In the table is shown the percentage of sound steel that has been obtained from 100 pressed ingots, all from distinct heats, with one or two exceptions. This table gives the results from consecutive ingots that were pressed, and does not merely contain the results from ingots that proved good. It will be seen that in no case is there any unsound steel below 90 per cent of the whole ingot.

In the table, where 100 per cent of sound steel is given, it is to be understood that no internal defects

Table Showing Percentage of Sound Steel Obtained

96	94	90	95
95	100	94	94
92	92	100	94
96	96	94	94
100	94	94	93
95	95	95	95
95	92	92	92
100	92	94	90
96	96	96	96
97	96	90	94
96	97	99	94
94	94	95	93
93	100	96	92
94	94	94	90
95	96	97	93
100	93	91	97
92	96	100	100
97	100	97	100
97	97	97	96
97	98	97	97
97	95	97	97
97	97	96	100
94	94	100	94
100	100	97	100
97	93	91	94

Average of above 100 pressed ingots = 95.5 per cent sound steel.

*Abstract of paper read, May 3, before the Iron and Steel Institute.

were found. The tests were carried out as follows: A discard of 20 per cent was cut off the top of the 6-in. billet, without any cropping in the cogging mill, so that the top contains the original top of the ingot, which in ordinary practice is always taken off. This 20 per cent was then broken up into individual shell lengths, and the fractures of each one examined for pipe, blow-holes, and segregation and surface defects. It will be seen that an average of 95 per cent of sound steel was obtained from the ingots pressed.

A sulphur print from the planed surfaces of this 20 per cent discard from one of these pressed ingots, after being rolled down into billets, broken into 6-in. shell lengths of about 133 lb. each and the ends planed, showed very clearly the purer center, the almost total dispersal of the segregate, and the normal outer portion. Although the pressure is applied on the upper 15 per cent of the ingot only, there is no doubt that its influence is felt somewhat lower, and probably can be traced to a distance of 20 to 25 per cent from the top.

If the author's paper in the *Journal of the Iron and Steel Institute*, 1913, No. 1, be referred to, it will be seen that the carbon, sulphur and phosphorus in the steel were thrown out into a definite line bounding the purer center. This effect was probably partly due to the use of rolls, as they operated more rapidly than the press. With the press now in use, the segregate is more regularly diffused, and this line is not found. The carbon percentage is somewhat lower in the center for about 10 per cent of the area of the whole face than the average of the ingot. The phosphorus and sulphur are also lower in this area, but there can be no objection to finding a lower percentage of these impurities. Manganese and silicon are practically not affected, so that there is no discussion upon these metalloids.

We therefore confine the difference found to the reduction in the percentage of carbon, and this raises the question for metallurgists and engineers as to whether there is really any objection in this. If it be an objection, however, it should certainly be preferred to the present condition of having an unknown excess of carbon, sulphur, and phosphorus in a given place, accompanied very often with unsound steel at the same spot. For rails, a somewhat softer center, coupled with sound steel, can hardly be considered objectionable, seeing that a hard wearing surface is desired. For all ordinary material, when the physical tests desired are obtained, it should also not be objected to, especially if economical advantages can be obtained by its use.

From these results one can anticipate what will be obtained from a finished rail, and it will be observed that sound commercial steel can be obtained from the compressed steel to within 3 or 4 per cent from the top of the ingot, which amount it will be necessary to crop when rolling ingots in a modern mill in which large outputs are obtained, so that by this method the entire ingot, minus its necessary cropping, can be satisfactorily made use of.

Commercial Application

From the foregoing results, it will probably be admitted that a larger percentage of solid steel, fit for commercial purposes, can be obtained if the top portion of the ingot be compressed before its center is entirely solid than is the case with the usual method of casting with refractory tops. The problem, therefore, narrows itself down to one of a practical and commercial nature. If a sufficient increase in the percentage of commercial steel can be obtained rather than producing this amount as scrap to be remelted, and if the difference in price between the commercial product and scrap value is going to be large enough to permit of the installation and operation of the necessary plant, then it will be of interest to see whether the process can be applied in practice upon large outputs.

No one to-day can forecast future values. We are told to expect a scarcity of raw materials for post-war conditions, and if this should be so, then it behooves everyone more than ever to try to increase yields of finished products and to decrease consumption of raw materials and labor in the production of these products wherever possible.

For the ordinary cheap trades, such as the rail trade,

which deals with large outputs, the successful operation of this process means the adoption of a standard ingot of suitable size to suit the working conditions of the plant, and the observance and carrying out of a timetable as between pouring, stripping, and pressing the ingot, otherwise the method cannot be satisfactorily made use of. For forging and special trades, which use ingots of sufficient size, there should be no practical difficulties in installing the process if it were found of advantage to do so. In these shops the output of steel is not great when compared to some, and the ingots for many trades are sufficiently large to allow of ample time to compress them.

Where the Bessemer process is used, the difficulties would be small as the heats are cast in a steady progression through the working shift. In a shop with 20-ton converters, casting the steel into 5-ton ingots, one press would easily keep ahead of the converter, as it would squeeze each cast in less time than the converter takes from blow to blow. It follows, therefore, that to deal with a modern Bessemer shop output a press would be required for each converter blowing simultaneously, and that the stripping arrangements must be adequately arranged also.

For stripping and pressing six 50-ton heats of steel of 5-ton ingots the average time taken was 3.2 minutes per ingot. This time will be considerably reduced in a properly designed stripping and dressing plant, as no doubt a period of 2½ minutes from ingot to ingot will be obtainable.

Difficulties in Open-Hearth Mills

In considering this squeezing process, one can see difficulties in open-hearth shops having a large number of furnaces, some of which cast simultaneously, and where for some reason or other best known to the furnace operators, they seem to prefer to flood the shop with a large number of casts in a few hours, rather than have the casts more evenly divided over the entire shift. This difficulty should not be encountered so much in those shops in which the Talbot steel process has been installed, as they have fewer but larger units. It will have to be met in large open-hearth shops, however, using fixed furnaces of smaller capacity.

With a 5-ton ingot, we know from the results already obtained that if the ingot be taken and pressed at about 1½ hr. after pouring, and another be taken at 2½ hr. after teeming, we obtain in both cases sound steel, as no pipe is found in the rolled product. It follows, therefore, that there is a period of some 60 min. during which the operation of squeezing a particular ingot of the size given can be satisfactorily carried out. In casting a 50-ton heat of steel into 5-ton ingots, a period of at least 30 min. is necessary from the time the steel begins to run from the furnace into the ladle to the time the ladle is empty.

The press, with a properly arranged stripping plant, will squeeze 10 ingots of 5 tons each—that is, the whole cast—in 25 min., and therefore one press can take care of two casts which may have been poured simultaneously, as there is a period of 60 min. during which any ingot can be successfully squeezed, and the whole 20 can be readily squeezed within this period. For each

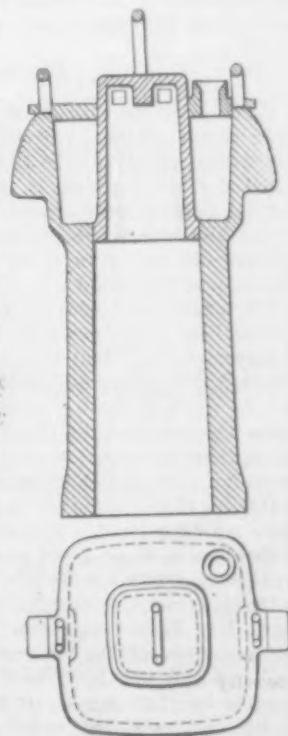


Fig. 2—The Suspended Centrifugal Core Around Which Molten Slag Is Poured to Form Hot Tops

press, therefore, that might be installed two casts poured simultaneously can be taken care of, but if the output of steel for any one or more hours should be larger than this an increased number of presses would have to be installed to take care of the fluctuating hourly supply of ingots. For this reason the importance of spreading the tapping of furnaces more evenly over the entire working shift is seen, as it saves duplication in the stripping and pressing plant.

As has been previously stated, the localization of the piped portion of the ingot, while retaining a higher temperature in such top portion, is successfully brought about by furnishing the upper top portion of the ingot with a refractory top, such refractory top being in practice made by ramming ganister or lining the top portion with firebricks. With large numbers of ingots in use, this is found to be an expensive method, requiring a large number of bricklayers to keep them in repair, as the brick tops only go for a few heats before requiring renewal.

A Cheap Refractory Top

The author has devised a cheaper method of making these refractory tops to the molds, and this is illustrated in Fig. 2. The method consists in providing an ingot mold with a suspended central core as shown in the figure, and pouring liquid slag into the space formed between the core and the recessed side of the mold. As soon as the slag has become solid the core is removed, when the mold can be brought into use, and the steel cast against the slag-lined part. With suitable blast-furnace slag from 15 to 20 casts can be obtained before renewal is necessary, but with more refractory slags, such as the slag from the acid open-hearth steel process, a longer life may be expected before renewal becomes necessary.

A heating, stripping and pressing plant has been designed to take care of from 7000 to 8000 tons of 5-ton ingots per full working week. Two presses are provided to cope with a fluctuating supply of ingots, and ample stripping power is installed to take care of the casts as they are delivered under the gantry.

Discussion

E. H. SANITER said there was one paragraph in the paper about which he would like to ask Mr. Talbot. It is where he said: "In the table, where 100 per cent of sound steel is given, it is to be understood that no internal defects were found." He would like to ask if he had had any trouble with the cracking of the skin, as there did not seem to be much information on that subject, and it seemed a possible source of trouble.

DR. STEAD said that at his request Mr. Talbot had allowed him to go down to his works to see his plant in operation. He had asked Mr. Talbot whether occasionally, in the case of casting at a very high temperature, he did not have a second pipe—a pipe well down to the thicker part of the ingot—and he had assured him that on no occasion at any trial had he found any secondary pipe, but that pipe was absolutely eliminated.

COSMO JOHNS admired very much Mr. Talbot's most ingenious slag head. The only point was that it was not applicable to an ingot cast with the large end down and the small end up.

DR. HATFIELD, referring to that part of the paper where Mr. Talbot said that the average temperature over a number of 3½-ton ingots when stripped between one hour and one hour and a half after casting was found to be 1140 deg. C. at the top and 940 deg. C. at the bottom, said he supposed that, owing to having a refractory head at the top, Mr. Talbot had taken that temperature by the optical pyrometer. He took it the temperature going in from the outside to the center would not be a particularly steep gradient. He had understood that Mr. Talbot depended in his process upon squeezing the top end of the ingot and forcing the segregate out. It seemed to him that if the outside was 1140 deg. C., it was really below the solidity for any alkalis that would be occurring in that part of the ingot. And while they must accept Mr. Talbot's photographs as showing that he had obtained a sound ingot right to the end of it, he rather thought that, if they

cut one of those ingots down to the middle and polished it very carefully, although they might find it was in a state of soundness, it might yet have the segregate at the top end. He could quite conceive that for rail work and for large structural purposes the process might be a success, but with work such as his own and the different armament firms were concerned with—alloy steels—he regarded it as a very different proposition.

E. F. LAW said Mr. Talbot's idea was to get a good ingot, and if he were successful in that, there was nothing to be said in favor of casting an ingot in the way suggested by Cosmo Johns.

H. H. ASHDOWN said with regard to the important point raised by Dr. Hatfield, that the process was not a new one. Some 14 years ago a very similar device had been adopted at Woolwich in order to obtain a much improved quality of steel for special shell work. It was there found that although it was possible to obtain a sound ingot, the segregates could not be removed unless pressure was applied almost immediately after the casting, which he thought would be very awkward. He should like to ask Mr. Talbot whether, with the high strain put on the ingot, there was no possibility of the ingot being fractured when under pressure.

DR. F. ROGERS said it was quite true one did not get gun quality with the top 2 in. of the ingot, but if 90 per cent of usable steel was obtained, that would be very useful. He would like to ask Mr. Talbot whether the outline of the ingot in Fig. 1 was something like the ordinary form of die. There were some great indentations in the head there and, of course, those would have to disappear when the ingot was rolled down. Something like 2 ft. 6 in. of the section of ingot was left at the top to be rolled down ultimately to the billet. That would give them the amount of compression used at the top, to which he found no reference in the paper. Again, the form of the die was important, because near the corners there was a possibility of cracking and tearing. He would like to know whether that was obviated by dies of the form indicated. Another point he would like to ask about was with reference to Fig. 2. The core shown forming the head of slag was evidently a casting or something, and it would have to be lowered to remove it; and he imagined that might possibly be slightly awkward. He would be glad if Mr. Talbot would also tell them whether he got any flaking or chipping of the refractory head by the great heat made in it, especially the steam radiating from the hot metal.

MR. TALBOT, in reply, said Mr. Saniter had inquired as to whether there had been trouble with reference to the surface. The sections shown were good enough on their surface to pass inspection. When made into shells perhaps he would be able to tell them something more about it. Of course, the top crop naturally was not a commercial product. Dr. Hatfield had asked with reference to the position of the segregate. It was possible, if desired, to extrude some of that segregate, but he did not desire to do that; his object was to concentrate it in the top 4 per cent, and he thought that was where it was in those two pieces. If he could get the segregate in those two positions, he was perfectly satisfied.

Cosmo Johns had said there would be difficulty in casting an ingot large end up. Mr. Law had taken out of his mouth, said Mr. Talbot, what he should have said in reply, namely, that if he got what he wanted, to make cheap steel (which was what he was after), particularly for rail purposes, he would be satisfied in adopting this method. If he cast thousands of tons a week with the large end up, and if the results were satisfactory, why should he cast the other way? Mr. Rogers had asked about the dies. The die illustrated was the first die used and it put the depression on the side. No doubt they had all seen a three-sided whiskey bottle; the die looked very similar to that. They had to allow sufficient margin from the corners not to squeeze too near the corners. Of course, it was necessary not to get that in too deep, because in that way a rag might easily be caused in the cogging plant. As to the slag core, there was no trouble at all. The slag was very dense, and there was no flaking with it. Basic open-hearth slag up to the present was, unfortunately, not satisfactory; its condition was not sufficiently solid.

Steel Centers Respond to Liberty's Call

Fourth Campaign Starts with Great Enthusiasm—Steel Corporation Subscribes \$40,000,000
—Machinery Men Prominent Among Workers



THE Fourth Liberty Loan campaign was started with great enthusiasm in all parts of the country last Saturday. The fact that the amount called for is double that of the third Liberty loan caused the workers to begin with renewed determination and reports received by THE IRON AGE from leading iron, steel and machinery centers, indicate that subscriptions are being entered more rapidly

than at any of the three preceding loans. Naturally, the largest subscription from any steel company comes from the United States Steel Corporation, which announced that it would subscribe for \$40,000,000 of the fourth Liberty Loan, which is \$5,000,000 in excess of its subscription for the third loan.

In New York following the address of President Wilson Friday evening, the campaign was given a rousing start Saturday. Fifth Avenue was transformed into the Avenue of the Allies at 9 o'clock in the morning. There was a magnificent display of flags of all the Allies and guns in the harbor fired salutes, whistles were blown in all parts of the city and in all the boroughs appropriate celebrations were held. An elaborate program of celebrations in honor of all the Allied nations to be held during the next three weeks has been arranged. The subscriptions for the first day in New York amounted to about \$200,000,000. Among the important New York committees are the Machinery, Machine Tools and Railway Supplies Committee and the Committee on Hardware, Metals and Allied Trades. The chairman of the former is Rufus L. Patterson, president, American Machine & Foundry Co., with

Charles A. Hirschberg, publicity manager, Ingersoll-Rand Co., vice-chairman, and W. C. Lange, Doehler Die Casting Co., secretary. The chairman for Brooklyn is F. H. Moses, secretary and treasurer, Adriance Machine Works, Inc.

The chairman of the Hardware, Metals and Allied Trades Committee is W. Hetherington Taylor, president Iron Age Publishing Co., with George A. Graham, J. H. Graham & Co., vice-chairman, and Edgar G. Higgins, secretary. The chairman of the Brooklyn committee is Will I. Sherwood, William Vogel & Bros., Inc.

Among the subscriptions announced in New York were:

United States Steel Corporation.....	\$40,000,000
H. W. Johns-Manville Co.....	1,500,000
Baldwin Locomotive Works.....	300,000
New Jersey Zinc Co.....	2,000,000
Underwood Typewriter Co.....	750,000
Crocker Brothers	200,000
Columbia Steel & Shafting Co.....	100,000

Influenza in New England

Reports of the initial success of the Fourth Liberty Loan in New England states are very meager but highly satisfactory. This is due largely to the fact that at the last minute the machinery that had been organized to handle the sale of bonds was badly disrupted by the measures taken to prevent the spread of Spanish influenza. Many mass meetings and parades were entirely abandoned as orders were issued in many of the industrial centers to close theaters, schools and other places where Liberty Loan gatherings had been planned.

One of President Wilson's Telling Sentences

From his Appeal to the American People to
Subscribe for Fourth Liberty Loan Bonds

The money that is held back now will be of little use or value if the war is not won and the selfish masters of Germany are permitted to dictate what America may and may not do.

Woodrow Wilson

Worcester, Mass., which had planned a campaign to make the entire subscription in one day, Sept. 28, under the guidance of Charles L. Allen, treasurer and general manager Norton Co., was reported to have oversubscribed its quota of \$15,000,000 on that day, even though the plan of solicitation was utterly changed the preceding day. Most of the factories reported that they had 100 per cent subscriptions. In other cities, particularly in the munitions cities, many factories reported that 100 per cent subscriptions were made on the first day of the campaign. Nearly every city reports that it expects to clean up its local campaign in the current week and that the spirit of the people, especially the workers, is better and their subscriptions more liberal than in the previous loan campaigns.

"Will to Win" Spirit Grips Buffalo

The opening gun for the fourth Liberty loan in Buffalo was a blast for liberty. An immense crowd, comprising many prominent citizens, participated in the inauguration ceremonies at Lafayette Square, in the center of the city on Saturday afternoon and was roused to great heights of patriotic fervor by the speeches and by the unveiling of a memorial tablet of bronze placed on the soldiers' monument in the Square. The tablet—surrounded by a wreath—contains in a roll of honor the names of over 80 Buffalo men who have already given their lives "over there" in the cause of liberty and democracy. This portion of the ceremonies was in charge of the Civil War veterans and a salute of three volleys of musketry was fired by a squad of National Guard Soldiers.

The quota of bonds assigned to be subscribed by the citizens of Buffalo is \$61,648,400. Bond selling was commenced promptly, in booths and in industrial plants throughout the city, and an augury of success was shown by subscriptions reaching a huge total pledged, as announced at a dinner held by the workers in the evening.

Walter F. Cooke, a prominent attorney, who had charge of the third Liberty Loan, is chairman of the general committee and the executive committee.

The Iron and Steel committee is again headed by Henry D. Miles, president Buffalo Foundry & Machine Co. and president of the Chamber of Commerce, as chairman; S. B. E. McVay, secretary Seneca Iron & Steel Co., is vice chairman, and Frank Moll, of Ford & Enos, is secretary of the committee. The quota to be raised by this committee is \$7,000,000.

Robert L. Crane, resident sales agent Prentiss Tool & Supply Co., is chairman of the Machinery Dealers' Division, including new and second hand machinery, manufacturers of engines, gas and gasoline, and iron machine shops, with a quota of \$1,500,000.

L. R. Cooper, secretary of The Crosby Co., manufacturer of sheet metal specialties is chairman of the Sheet Metal Committee, having a quota of \$850,000; and the Scrap Metals division is represented by Harry Roblin, president Buffalo Housewrecking & Salvage Co., as committee chairman, with a committee quota of \$325,000.

The Wholesale and Retail Hardware Dealers Committee is in charge of Sheldon Weed, president Weed & Co., as chairman, with an assigned quota of \$550,000.

The quotas assigned to these allied committees are in addition to the \$7,000,000 allotted to the Iron and Steel Committee.

The chairmen of all these committees are enthusiastic in the belief that their committee will go "over the top" with flying colors for full—or more than full—amounts.

South Is Enthusiastic

BIRMINGHAM, ALA., Sept. 30.—Birmingham has begun its Fourth Liberty Loan drive with full determination to better even its own fine record, which was as follows: First drive, was asked for \$3,000,000 and subscribed for \$6,500,000; second drive, was asked for \$4,500,000 and subscribed for \$8,250,000; third drive, was asked for \$5,000,000 and subscribed for \$7,871,500.

As usual, the captains of industry are in harness. The county chairman is Murray Brown, wholesale grocer. The head of the allied armies, whose personnel

does the soliciting, is J. Frank Rushton, coal operator, and the chairman of the mining division is James Bonnyman, another coal operator. Among the other prominent workers is Harry W. Coffin, vice-president Alabama Co., who headed the third drive and made such a success, now on the executive committee. On the same committee is J. D. Moore, Moore & Handley Hardware Co., who has charge of the drive in the Birmingham zone. The special corporations and railroads committee, which is expected to bring in the biggest amounts and will do so, is headed by C. T. Fairbairne, Southern manager of the Republic Iron & Steel Co. On his committee are such men as George Gordon Crawford, president of the Tennessee Coal, Iron & R. R. Co.; L. Sevier, vice-president Sloss-Sheffield Steel & Iron Co.; B. F. Moore of Moore & Handley Hardware Co.; C. E. Thomas, Wimberley-Thomas Hardware Co.; H. F. Hilleke, superintendent Semet-Solvay Co.; A. H. Woodward, chairman Woodward Co.; George W. Conners, Conners-Weyman Co.; I. F. Young, Young and Vann, mine and mill supplies; John F. Fletcher, Shook & Fletcher; A. R. Forsythe, Gulf States Steel Co.; Charles De Bardeleben, coal operator; Paschal Shook, Shook & Fletcher; J. R. McWane, American Cast Iron Pipe Co.; W. H. Hassinger, capitalist, and Henry L. Badham, Bessemer Coal & Iron Co.

The sum set for Birmingham to raise is \$9,170,000. This is much larger than the former ones, but the district is going to it and there is no such word as fail. A number of large subscriptions had been pledged before the drive began and will be announced before the week is over. There will be a big parade on Oct. 12, in which all war workers will take part.

Noisy Beginning at Cleveland

CLEVELAND, Oct. 1.—With an enthusiasm equal to if not greater than that aroused at the opening of the previous Liberty Loan campaigns, Cleveland began its fourth drive for funds for world freedom with the ringing of bells, blowing of whistles and the booming of cannon. With a better and larger organization of workers than during the previous drives, the city will strive to go over the top with its quota of over \$112,000,000 ahead of schedule. Following the formal opening Saturday noon, a Liberty Loan mass meeting was held in the evening, during which the principal speakers were former President William Howard Taft and Rev. Charles Gore, bishop of Oxford, Eng. Sunday afternoon a Liberty Loan parade took place. In this 25,000 took part, representing various organizations. The parade, which included numerous floats, was led by the Great Lakes Naval Station band.

The real work of soliciting subscriptions started Monday and men prominent in the iron, steel and machinery fields are for the time being relegating their personal business to the background and devoting their time to making the drive a success.

The Liberty Loan campaign in Cleveland factories is being conducted similarly to the third loan drive. The sale of bonds in industrial plants is under the general direction of an industrial sales committee. This committee has a force of salesmen which consisted of 75 during the third drive, but now increased to 200 and these salesmen are co-operating with industrial companies in conducting the campaigns throughout the manufacturing plants. However the actual work of securing subscriptions from employees is almost wholly in the hands of an organization in each plant. In most plants, this is being handled by the same committee or organization that carried on the work during the third loan drive. In many plants, the gathering of pledges was started two or three days before the formal opening of the campaign.

In the third Liberty Loan campaign \$11,500,000 in subscriptions was secured from industrial workers, subscriptions being made by 160,000 out of 233,000 employees. The quota from industrial workers in this campaign is \$25,000,000. The slogan "Buy a Bond" used in the last campaign has been replaced with "Buy Bonds." In the last drive thousands of workmen bought

(Continued on page 866)

A Small Universal Grinding Machine

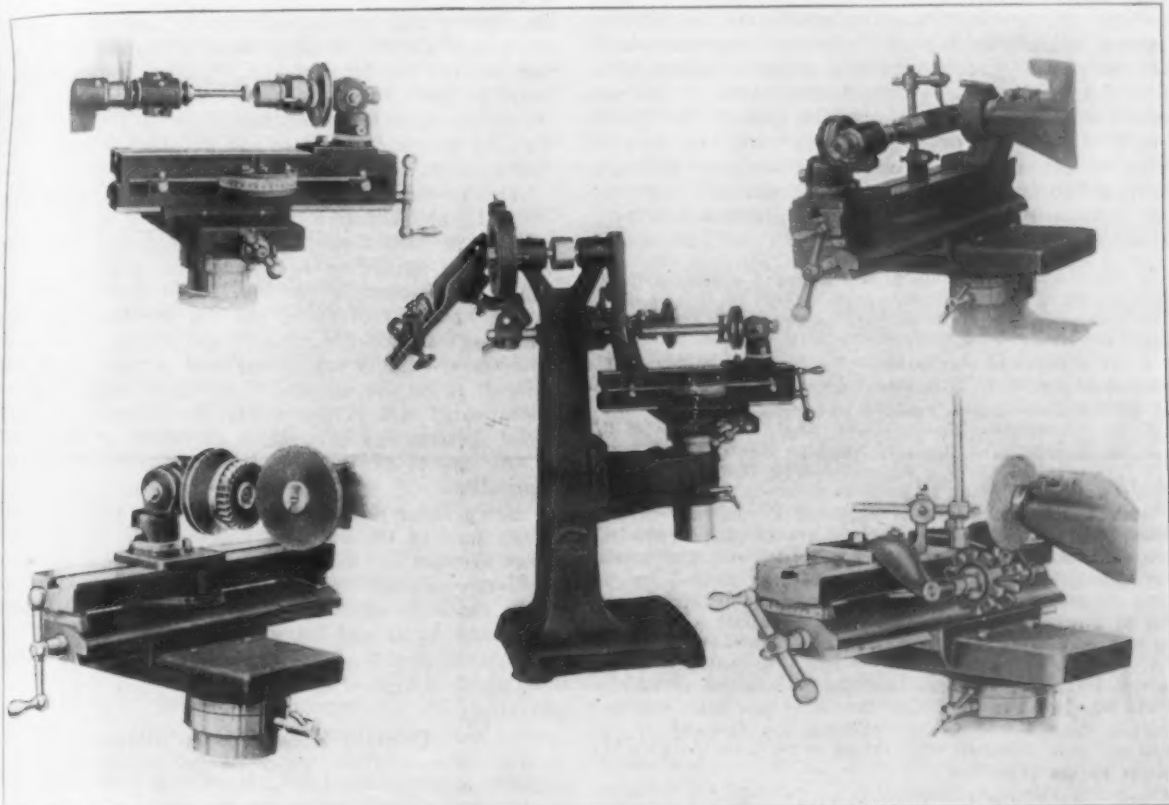
For use in shops and manufacturing plants where a medium capacity universal tool-grinding machine is needed, the Wilmarth & Morman Co., Grand Rapids, Mich., has brought out a small-sized machine. It is intended to handle all kinds of toolroom grinding within its capacity, such as straight, taper or rose reamers; milling cutters of the spiral, bevel, spur, formed and end types; as well as taps, counterbores, countersinks and drills, and with the use of an additional attachment, both cylindrical and internal grinding operations can also be performed.

The general construction of the machine is the same as the larger sizes built by this company. The saddle and knee swivel inside the sleeve, enabling the table to be set at any angle within a range of 350 deg., while the top table will swivel through a complete circle independent of the sub-table. These movements in connection with the universal headstock which has both

of taper. A fine adjustment is provided at the front of the table to facilitate this movement. The use of the universal headstock for grinding face and side milling cutters up to 16 in. in diameter is brought out in the view in the lower left corner. In this illustration a face mill is being ground. For grinding gears and milling cutters where a saucer wheel is used the work is mounted on an arbor or mandrel between drop centers and traversed under the wheel. The maximum diameter of a cutter of this type which can be handled is 5½ in. in diameter.

Heavy Foreign Trade in August

WASHINGTON, Oct. 1.—Both imports and exports of merchandise were greater during August than in any previous August in the history of American foreign trade, according to an announcement by the Bureau of Foreign and Domestic Commerce, Department of Com-



Some Typical Examples of the Different Grinding Operations That Can Be Performed on a New Small Universal Machine. The large view in the center shows the complete machine arranged for cylindrical grinding, while the small one in the upper left corner illustrates the machine set up for internal grinding. The view at the upper right shows a straight flute type of reamer being ground on the face of a cup wheel and in the lower left corner the use of the universal headstock for grinding a face mill is brought out. In the lower right corner a formed cutter is being ground by passing it under a saucer wheel.

horizontal and vertical swivels graduated to read in degrees, it is pointed out, enables any angle or compound angle to be obtained readily. A fine adjustment by two knurled head screws at the front of the table provides for taper grinding. The vertical adjustment of 6 in. is obtained by a worm and wormwheel pinion and rack, which is relied upon to give a fine adjustment, and the handwheel is provided with a graduated dial. The universal vise has two swivels and a sliding movement which in connection with the micrometer vertical adjustment of the table enables it to be placed in almost any desired position.

Some idea of the various grinding operations that can be performed by this machine can be gathered from the accompanying illustration. In the view in the upper left corner, the machine is equipped with a 3-in. three-jaw independent chuck for doing internal grinding, the capacity for this work being holes 5 in. deep with a 10-in. swing. In the opposite corner, a straight flute type of reamer is being ground on the face of a cup wheel. Taper reamers and arbors which do not exceed 17 in. in length can be handled in the same way, except that the table is swiveled to give the desired degree

merce. Imports amounted to \$273,000,000, an increase of \$5,000,000 over August, 1917, and \$31,000,000 over July of this year. During the eight months ended with August, imports were \$2,060,000,000, a slight increase over the corresponding period of 1917. Exports increased from \$508,000,000 in July to \$529,000,000 in August as compared with \$488,000,000 in August, 1917. During the first eight months of this year exports totaled \$4,012,000,000, a decrease of \$138,000,000 as compared with a similar period of 1917.

The shortage of unskilled labor is decreasing, according to the latest bulletin of the United States Employment Service. The shortage of women workers, however, is increasing. The requirements for unskilled laborers scheduled by employers for the period to Oct. 1, as reported to Washington by the Federal directors for the States, have dropped from a daily average of 20,000 to 30,000 men in the middle of August to a daily average of about 3000 a day during the period from Aug. 28 to Sept. 4. On Sept. 5 men asked for totaled only 1100.

SCREW THREAD STANDARDS

Commission to Open Hearings at New York, Oct. 7—Sub-committees Appointed

The commission recently authorized by Congress to ascertain and establish standards of screw threads in the United States has been appointed. A formal meeting of the commission was held in Washington, Sept. 23 and 24. As a result of this meeting a tentative program of the activities of the commission has been outlined.

It is the intention to conduct several hearings on certain topics relating to the standardization of screw threads at New York; Dayton, Ohio; Detroit, Washington, and such other places as may be deemed advisable. These hearings are for the purpose of securing data, information, and the various view-points of manufacturers and users of screw thread products. With the information secured as a result of these hearings the work of the commission in establishing national standards for the various requirements of threaded work and in addition in establishing tolerances for the interchangeable manufacture of different classes and grades of work will be greatly facilitated. The first hearing to be conducted will be held at 10 a. m. Oct. 7 in the Engineering Societies Building, 29 West Thirty-ninth Street, New York. At this hearing there will be discussed certain restricted screw thread subjects as follows:

1. As a national standard, is there any objection to the continuation of the U. S. Standard system of thread diameters and pitches for general use in practically its present shape?
2. As a national standard, is there any objection to the adoption of the S. A. E. system of diameters and pitches of fine threads?
3. As a national standard, to what extent could the A. S. M. E. system of standard machine screws be adopted?
4. There seems to be a general feeling that in standardization we should make it possible to cover several classes of work and there has been suggested a minimum of four classes of fits to provide for different grades of work ranging from reasonably wrench-tight fits to very loose fits. Would such a classification, including at least four classes, be sufficient for all grades of work encountered in the various systems of threads previously mentioned or would a classification including more than four classes be required?
5. Is there any objection to adopting the "standard hole" practice for screw threads—that is, the practice of making all the taps for any particular thread of one basic size and securing the required fit by changing the diameter of the screw on male threaded work which is to assemble with the nut cut by the basic tap.

The commission has been divided up into four committees, as follows:

1. *Pitches, systems, form of thread*—F. O. Wells, Com. S. M. Robinson, E. H. Ehrman, H. T. Herr, H. W. Bearce, secretary.
2. *Tolerances, classification*—James Hartness, E. H. Ehrman, Col. E. C. Peck, H. L. Van Keuren, secretary.
3. *Nomenclature and terminology*—F. O. Wells, Com. E. J. Marquart, Major O. B. Zimmerman, Robert Lacy, secretary.
4. *Gages and methods of test*—Col. E. C. Peck, James Hartness, Com. E. J. Marquart, H. L. Van Keuren, secretary.

In addition to the committees from the commission, it has been planned to call into conference, somewhat as associates, men who are authorities in the manufacture and use of screw thread products.

New Snyder Furnace Installation

The Industrial Electric Furnace Co., Chicago, maker of the Snyder electric furnace, is installing a 5-ton furnace in the plant of the Zimmerman Steel Co., Bettendorf, Ia. It is a three-phase furnace, designed for acid operation, and will be used for general work. The installation is to replace the converter which the company had been using.

The American Steel Tube Co., Toledo, Ohio, is now located at its new plant on Buckeye Street and Terminal Railroad.

MANUFACTURERS RESPOND

Eager to Help Win the War by Organizing Training Departments

WASHINGTON, Oct. 1.—H. E. Miles, Chief of the Training Division of the Training and Dilution Service, who has returned to Washington from a Western trip, reports a great response to the call upon manufacturers to organize factory training departments for workers going into war industries. He addressed large meetings in Cleveland, Milwaukee, Detroit, Cincinnati and Chicago, which created enthusiasm among manufacturers. The educational committee of the National Metal Trades in Chicago has sent a special delegation to inspect the training methods used in the Recording & Computing Machine Co., at Dayton; the Curtiss Airplane Co., at Buffalo, and the Norton Grinding Co. These three firms were selected as representing three distinct types, viz.: repetitive processes, general organization and non-repeat work. The Chicago Board of Education this week donated a vacant school building perfect for factory and machine training and has voted \$10,000 for preliminary expense in equipping the building. Leading manufacturers of the city are installing training machines and production men from the factories will outline the policies subject to the control of the school board under general supervision of the Training and Dilution Service.

In the meantime the United States Employment Service is appealing to the skilled mechanics of the country not engaged on war work to take their important part in carrying out the war program everywhere. The call for experienced toolmakers and machinists is rapidly increasing and it has become more difficult to fill the demands. As an example of the importance of men of this craft, one concern in Georgia could increase its production of heavy artillery shells to the extent of 500 per day if it had 50 additional machinists.

Since the completion of the first cantonment program, men of the building trades have not been in as large demand as other skilled mechanics, but because of the large increase in the army, immediate additions are to be made to cantonments, more hospitals are to be built, and Army and Navy bases are to be enlarged, all of which mean increased demands for building craftsmen.

Central Steel Co. Additions

The Central Steel Co., Massillon, Ohio, is making a number of extensions to its plant. Twenty-three Bradley hand poked gas producers will be installed, supplementing the 16 Morgan producers now in use. One new producer will be added to each of the seven 50-ton furnaces, five to each of the 75-ton furnaces and the remaining eight will supply gas for the soaking pits. Two additional soaking pits will be built. These will be somewhat larger than those now in use, being 4-hole pits with a 6-ingot capacity for each hole. Additional boiler house equipment will also be installed. This will include Sanford-Riley stokers, a coal and ash handling plant to be erected by the Jeffrey Mfg. Co. and a Sorge-Cochrane hot process water purifying system for feed water for the boilers.

The Western Cartridge Co., Alton, Ill., has been ordered by the Government to double its cartridge output for the army and in conjunction therewith the Government authorities have arranged for the expenditure of \$1,600,000 for housing the extra workmen who will be required. The working force is to be increased to 7500 from 4000 by Jan. 1, and by that time the output is to be increased by 200 per cent if equipment and workers can be obtained. The final increase will bring the production to 3,000,000 shells per day. The buildings to house the added employees will range from family size to dormitory capacity and a survey of the sites therefor has already begun. The contract for the buildings has been let to the Wimmer Construction Co.

Policy as to Women in Industries

United States Employment Service Issues Instructions—Health of Employees to Be Guarded—Slackers Expelled from Shipyards

WASHINGTON, Oct. 1.—After months of delay the United States Employment Service has issued specific instructions concerning the attitude which its representatives will take in questions concerning woman labor. Two general orders have been issued by Director General Densmore to the Federal directors of the various States outlining a program whereby the replacement of men by women and the introduction of women into new fields of war labor is to be controlled.

A feature of this program, already forecasted in this correspondence, is the addition of two women to each Community Labor Board, one representing women workers and the other industrial management.

"When women are wanted by employers engaged in war work, at employments which heretofore have not customarily been undertaken by women," says the first of these orders to the State directors, "the office to which the application is made should submit it immediately for approval to the community labor board for the district in which the work is to be done and should not act on such application until the approval of such community labor board has been secured. Such approval may be given with limitations as to the ages of the women to be employed or otherwise. Such limitations must be strictly observed. Such approval having been secured, the United States Employment Service should make every effort to fill the order.

"In any district where the local community labor board decides that the war emergency requires men engaged in non-war industries should be replaced by women the United States Employment Service will use every effort to assist in bringing about such replacement.

"The United States Employment Service should not place women in forms of non-war work which heretofore have not been customarily performed by women

without first securing the approval of the community labor board.

"The officers of the United States Employment Service should give every possible assistance when called upon by any community labor board to investigate or report upon conditions in any local industry or plant to determine the propriety of using women."

The second of these orders directs the selection of the additional members for the community labor board, suggesting that the woman who represents workers shall preferably be one who has worked in industry.

"It is highly essential," continues this order, "that its representative shall be a woman who has practical familiarity with the problems involved; that she shall command the respect of the community, and shall be capable of taking a broad vision of the nation's needs and of exercising conservative judgment.

"Upon all questions concerning the utilization of women in industry, the two women members shall have full voting powers. They shall be ex-officio and non-voting members of the community labor board in respect to other matters, but shall be invited to attend all meetings of the board."

This order also gives definitions of the jurisdiction of these boards. A machinery of procedure for appeal of doubtful cases is provided.

The Department of Labor has also announced that a national conference of trade union women will be held in Washington on Oct. 4 and 5 under the auspices of the Women in Industry Service. Each international union having women membership has been invited to participate. The purpose of the conference is to enable the Government to obtain the counsel of working women in the labor unions in the formulation of national policies concerning the employment of women in war work.

Campaign for Health of Workers

WASHINGTON, Oct. 1.—The health of the workers is a vital factor in every industry. So the experience of the United States Shipping Board Emergency Fleet Corporation in caring for more than 300,000 shipyard workers is interesting to every manufacturer.

The Shipping Board has carried on an extensive health and efficiency campaign in every shipbuilding center of the United States. This campaign is in the hands of expert sanitary engineers attached to the Health and Sanitation Section of the board. By its vigilance this section has already nipped in the bud smallpox, typhoid fever and other epidemics which, if neglected, would have seriously handicapped Uncle Sam in his task of creating the world's greatest merchant marine. In its campaign of disease prevention the section has paid particular attention to the water supply of the 171 shipyards of the nation. Springs and other water sources which revealed evidences of pollution have been closed and pure water supplies provided.

At the present time the section is conducting a vigorous crusade against unsanitary restaurants and lunch rooms in the vicinity of shipyards. Thirteen of these on the Pacific coast have already been condemned and closed and condemnation proceedings have been instituted against others in different parts of the country. The section is an advocate of the company restaurant conducted upon a scientific basis. Investigation by experts of the section has shown that unwholesome food served in unsanitary restaurants has a decided tendency to lower the efficiency of workers.

The section has found that the social disease has the same evil effect upon the efficiency of shipyard

workers as it has upon the efficiency of soldiers on the battlefield, and army methods have been employed to combat the scourge. A campaign of education is being conducted among the workers in every yard in the country, and clinics have been established in every shipbuilding center. In this regard the section is co-operating closely with the War Department. In the State of Pennsylvania alone there are 100 of these clinics, and arrangements have been made with various hospitals for isolation wards.

The Health and Sanitation Section is under the supervision of Lieut.-Col. Phillip Schuyler Doane, who was detailed from the Medical Corps of the United States Army to take charge of the work. Colonel Doane is a Chicago surgeon of national reputation and is a recognized expert on sanitation.

"Our plan in a nutshell," he said, "is to safeguard in every possible way the health of shipyard workers so that they may apply the maximum efficiency to the building of ships. It is imperative that this should be done, and we are doing it to our best ability. In order to put forth his maximum effort as a fighter, the soldier must be in the very pink of physical condition, and the same rule applies to the men who are engaged in building ships to defeat Germany's submarine program and take our troops and supplies to France.

"Many employers have found it advisable to determine the condition of health of a worker at the time he enters the employ of the company and at intervals afterward. This procedure benefits both the employer and the workman. Physical examination properly carried out will bring to the attention of the examining

physician any communicable disease with which the applicant might be afflicted and which might be communicated to his fellow workmen. Applicants for employment suffering from minor ailments or condition of ill-health should not necessarily be excluded from employment, but should be given work for which they are best suited.

"Our program is as constructive as well as a progressive one, and it is rapidly transforming the 300,000 or more shipbuilders of the United States into the best physical conditioned and most efficient army of workers in the world."

Slackers Turned Out

WASHINGTON, Oct. 1.—After a conference with Chairman Hurley, Director General Schwab and Vice-President Piez of the Emergency Fleet Corporation, General Crowder announced that 20,000 slackers have been removed from the shipyards in the last two months as a result of reports that they have not properly performed their tasks. At the same time, the shipping board has withdrawn all requests for deferred classification for the shipyard employees, although the men genuinely entitled to such exemption will receive it. Shipping Board officials, however, have announced that they will not employ men who have reason to expect a Class 1 selection.

This is the result of the important delays which "slacking" in the shipyards have imposed upon the Shipping Board's program. The testimony of General Manager Piez before the Senate Commerce Committee about the breakdown of the Hog Island's much-advertised schedule had much to do with it. In the future the watch for slackers in all the yards will be greatly increased. Men who lost more than three days a month without a proper excuse are likely to find themselves deprived of their draft exemptions.

Another phase of these difficulties came out at the Cramps shipyard in Philadelphia where the workers struck because baseball players, pugilists and other inexperienced men were said to have been given positions as bosses. After a promise that the various charges would be investigated the men returned to work.

From Seattle, Wash., came a much more alarming dispatch. Eighteen thousand union metal workers there quit work under orders from the Seattle Metal Trades Council to work only four hours on Saturday unless paid overtime. The shipyard and Shipping Board officials claim this violated the men's agreement with the companies. So far the matter has not been brought to the attention of the War Labor Board here.

In retiring from Congress to accept a captaincy in the Chemical Warfare Service, Representative Albert Johnson of Washington fired a parting shot at the War Labor Board.

"Let us be careful," he said, "when we send out mediators and conciliators from Washington, the seat of the Government, that we do not send out biased and prejudiced agitators."

Government Will Pay

WASHINGTON, Oct. 1.—If future labor disputes result in increasing wages on work done under Government contracts, the Government will pay the increase out of the treasury, according to a new contract clause which has been adopted by the War Department. It is one of a series of new contract clauses provided by the department's standardization of these agreements.

Three of these new clauses are devoted to labor. The first provides that in the cases specified by law the wages of laborers, operatives and mechanics doing any part of the work contemplated by the contract, in the employ of the contractor, shall be computed upon a basic day rate of eight hours work, with overtime rates to be paid for at not less than time and one-half time for all time in excess of eight hours.

The second puts the burden of wage increases on the Government. In the event that labor disputes should arise directly affecting the performance of the contract or delaying its execution, says a statement by the department describing these clauses, the contractor is

obligated to comply with such adjustment as may be made by the Secretary. If such a settlement involves an increase of wages, thereby placing a burden on the contractor, he will be compensated for the extra outlay. Likewise in the event of a reduction of labor cost, the amount involved will be deducted from the cost in favor of the Government.

To speed up the settlement of disputes arising between the Government and the contractor regarding the adjustment of claims which might delay production during the settlement and further to make unnecessary the filing of lawsuits in the Court of Claims, a clause provides the means for the immediate adjustment of all such differences. In the event of the arising of any claims, doubts, or disputes as to the performance or non-performance of the contract which cannot be settled by mutual agreement, the question is placed before the Secretary of War or his duly authorized representative or representatives for adjustment. In the event that the matter is placed before a board, a majority decision of the latter shall be final, but permission to appeal directly to the Secretary of War within a limited time is allowed.

Cases Before National War Labor Board

WASHINGTON, Oct. 1.—The National War Labor Board has assumed jurisdiction in the controversy between the employees and the management of the General Electric Co. at Lynn, Mass. The jurisdiction of the board was questioned by the management on the ground that the Massachusetts State Board of Mediation and Conciliation has prior jurisdiction and that its efforts to effect a settlement had not been exhausted. The position of the employees was that the matter was properly before this board because the Massachusetts tribunal had waived jurisdiction in this board's favor. The board accepted this view and unanimously decided that its jurisdiction is clear. When this decision was announced, counsel for the management submitted in the name of the company, and, as a result, both sides are now before the War Labor Board. The board, it was announced, will make a finding on the basis of evidence already adduced before examiners as soon as possible.

Joint Chairmen Taft and Walsh and Messrs. Olander and Michael are hearing the complaints of the machinists employed by the Minneapolis Steel & Machinery Co. in Washington to-day. Yesterday Messrs. Taft and Walsh heard the argument in the Southern street car cases.

Examiners for the board heard the case of the employees of the interurban lines of the Portland Railway, Light & Power Co. at Portland, Ore., yesterday. To-day its examiners heard the complaint of the employees of the Union Carbide Co., at Sault Ste Marie, Mich., and of the employees of the Suwanee Iron Co.

Among the future hearings announced by the board for hearing in Washington are a number of street railroad cases and that of the International Molders' Union No. 196 vs. United Engineering & Foundry Co. of Youngstown, Ohio, to be heard Oct. 10 before Judge McChord, umpire selected by the board.

Strike Soon Ended

PORTLAND, ORE., Sept. 30.—Portland had a shortlived strike in its shipyards when about 7000 men refused to work and walked out. Threats to remove their deferred classification of registration brought practically all of them back to work two days later. Those who did not return have been reported to Washington and they will either be inducted immediately into the army or will be given a classification which will place them in the army in the near future. It is said that 90 per cent of the men who walked out are foreigners, many of them being Russians and Hungarians.

The Holmes Automobile Co., Canton, Ohio, has taken a large Government order for carts for the signal service of the Army for the transportation of wire.

NEW INDUSTRIAL RELATIONS*

Humanizing of Industry Along Lines of Colorado Fuel & Iron Plan Predicted

In the past industrial organization management has consisted of four subdivisions, financing, production, marketing, accounting, and the near future will add the fifth, industrial relations, which is just as important as any of the others in obtaining the greatest possible success.

The finished product of every industry is made up of two elements—the raw material plus the human element. Industry cannot and must not neglect the more important factor.

The war has caused a great shortage of labor in all industries at a time when a greater production than ever before is vitally necessary to win the war. Industrial executives are forced to recognize the importance of harmonious industrial relations and the necessity of eliminating the underlying causes of labor unrest and discontent.

This is not only a war-time problem, but it will always be an industrial factor, and should be so considered. It must be recognized that the greatest evolution of the future will be the emancipation of industrial workers from the customs of the past. Wise employers will do everything possible to aid this evolution in order that the greatest industrial efficiency may be obtained.

Even at this time organized labor is taking advantage of the present opportunity to endeavor to organize the iron and steel industry, and the War Industries Board is trying to standardize and stabilize labor wages. It is a good time for employers to get together with their men and adjust any grievances that may exist so there is no reason for the men organizing, as there is no reason why outside influences should interfere between employer and employee.

This idea has been followed out for a few years by the Colorado Fuel & Iron Co., at the suggestion of John D. Rockefeller, Jr., and it offers a vehicle which will do much to promote harmonious industrial relations in the future—when it and other plans of a like nature will be more widely adopted.

Possible Avenues for Evolution

The employment organization in the future will be a most important factor in eliminating labor turnover and the resulting accidents it causes.

Many companies are now organizing employment departments according to modern ideas as taught by the educational division of the War Industries Board and advocated by the employment clubs.

The health of industrial workers will receive as great consideration in factories in the future as accident prevention does now. Sickness costs vastly more than accidents. Health insurance will be in force and the result will be that years will be added to many lives and sickness will not breed the poverty it now does.

The medical department will look after the health of the worker and look after the families just as is done in some of the mining communities now. Every industry will soon have visiting nurses and provide hospital facilities for the care of the sick as well as the injured.

The industrial relations department will pay great attention to sanitation, plant cleanliness and beautification, ventilation, garbage and sewage disposal, drinking water, toilets, locker rooms and wash houses.

Welfare activities do much to promote health, efficiency and safety, and the "safety" man of the future will look after lunch rooms, commissaries, laundries, milk supplies, housing, gardens, picnics, vacation camps, Christmas parties, club houses, etc.

Life insurance and pension plans will relieve the industrial worker of the great dread of the future. Arrangements will be made to sell life insurance at cost

by a plan similar to that in the American Army to-day. Profit-sharing and bonus plans will be general, and the industries will provide savings and investment plans tending to interest the workers in the industry and thus stabilizing labor.

Educational activities will be carried on in all industries either at their own expense or in co-operation with the school authorities.

Immigrants will be Americanized and taught to read and write the American language. This will promote efficiency and reduce accidents.

Apprentices will be taught in higher elements of their trade by competent teachers and trade schools in industry will be common. No man will be put to work without thorough instructions not only as to his duties, but as to safety as well. Libraries will be established in all industries in connection with public libraries, or by the industries themselves.

Plant publications will be issued by all large industries and these will do everything possible to prevent accidents and sickness and take up all subjects relative to industrial relations and efficiency.

Free legal advice and assistance will be given employees so that they will not become the victims of sharpers.

Accident prevention work will be developed to the highest possible degree.

Standards for all types of guards will become universal by legal authority.

We will have accomplished much in accident prevention through promoting harmonious industrial relations in looking after the welfare of employees inside and outside the factories. A great deal more will be accomplished by State legislation in dealing with factory executives having an accident record higher than the established standards, which will be established by State authorities.

Chairman Dalton Explains

CLEVELAND, Oct. 1.—(By Wire).

H. G. Dalton, chairman of the Pig Iron Subcommittee of the American Iron and Steel Institute, at the request of some furnace companies, to-day sent a letter to pig iron producers giving illustrations to assist in determining the base price of iron at furnace under the double basing point plan incorporated in the revision of prices. Attention in this letter is called to the fact that in the official announcement the differential for foundry iron, silicon 1 to 1.75 per cent, was omitted. This differential, as heretofore, is to be 50c. per ton under the base price of No. 2 foundry.

Ford Buildings Taken Over

WASHINGTON, Oct. 1.—Seven buildings which were formerly used by the Ford Motor Company as distributing, assembling and service stations have been taken over by the Government through the Facilities Department of the General Staff. The buildings are located in St. Louis, Atlanta, Ga.; Long Island City, N. Y.; Cambridge, Mass.; Louisville, Ky.; San Francisco and Philadelphia.

Rail Prices Not Fixed

WASHINGTON, Oct. 1.—Action on the rail prices has again been postponed by the Price-Fixing Committee of the War Industries Board. This presumably is at the request of the Railroad Administration, which has been opposed to the fixing of prices by the Government.

By passing molten slag from an iron blast furnace, with sufficient silica and coke added, through an electric furnace, phosphorus is distilled over and collected under water, according to a patent (U. S. 1,274,479—Aug. 6, 1918) granted to H. O. H. Wenman, Bishop's Castle, England. A saving in electric consumption of about 90 per cent is claimed over an older but similar method. The reaction takes place at about 1300 to 1500 deg. C.

*Outlined before the convention of the National Safety Council at St. Louis, Sept. 18, by J. C. Smith, safety director, Inland Steel Co., Indiana Harbor, Ind.

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The Eight-Hour Day in Steel-Making

The action of the United States Steel Corporation in adopting the eight-hour day as a basis of wage payment is one of the most notable of the revolutions the war has caused in the steel industry. It need hardly be said that the new move is not designed to shorten working time at iron and steel works. That may be its ultimate or after-the-war effect. But to-day not less work but more is needed at every iron and steel plant in the country, and since there are no men to be had whose work could make up for shortened hours, the new regime really amounts to a liberal advance in wages—even more liberal than the 15 per cent advance of April 15 of this year, since the latter was figured from a considerably lower basis than to-day's.

It was foregone that whatever the Steel Corporation did in wage increases would be followed by other producers, as has been the case throughout the war. The various independent steel companies are already preparing to follow in whatever steps the Steel Corporation takes to make effective its general announcement of an "eight-hour basic day." This is being done even though the iron and steel trades, for reasons often explained, have long opposed the general introduction of eight-hour turns. In the continuous processes, it has always been argued, the substitution of eight-hour for twelve-hour shifts would involve at one stroke both a 50 per cent increase in labor cost and a 50 per cent increase in working forces. The time has never been when the manufacturers dared subject the industry to such a shock.

So far as the Administration at Washington has had to do with industry engaged in supplying the materials of war, the two main planks in its labor platform have been the eight-hour day and collective bargaining. In some cases its contention for the latter has involved treating with existing labor unions. But as the steel industry has been conspicuously committed to the open shop, and comparatively few of its employees belong to unions, sanction has been given in labor decisions coming from Washington, to a conference relation between companies and their men. This is exemplified in the suggested recognition of a committee of employees, and has taken shape, as indicated in these

columns last week, in the Midvale and Lukens plans of employee representation for the handling of all questions arising between employers and workmen.

With the Steel Corporation behind it, the eight-hour day feature of the Administration program is fastened upon the steel industry almost in a day. Collective bargaining will come more gradually but no less certainly. It is not difficult to see why the demand for it on the part of employees would be stronger than for the shortening of the wage measure from a 10-hour to an eight-hour length. For employee representation in works management is democracy in industry, while the eight-hour day under present conditions is only another wage advance.

The 10-hour day of common labor at steel works is still presumably a 10-hour day under the Steel Corporation's announcement, but the workmen will receive three hours' pay for the two hours of overtime. That means a 10 per cent advance. The men working 12 hours in continuous processes will receive six hours' pay for four hours of overtime. That means a 16 2/3 per cent advance. It may be that eventually eight-hour shifts will come, but they will only be possible when the supply of unskilled labor is much greater than at present—a condition that now seems far distant.

As a slogan of organized labor, the eight-hour day once meant a short work-day, lessened production per man and hence jobs for more men. An eight-hour day that lessened total output could not prevail in the steel industry, since most of its processes must be carried on throughout the 24 hours. But it would be a serious matter for the industries consuming iron and steel, whose processes are not continuous, if the short work-day should be forced upon them through the powerful sanction just given it by the producers of their raw materials. Much will depend upon the continued safeguarding of the steel industry from the control of militant unionism or, let us say, of union militarism. That in turn will depend upon the success of the producers of steel in winning their workmen to industrial democracy as represented by the new plan of conciliation and of conference relations between employers and employees.

Labor Cost in Iron Mining

The increased labor cost at underground iron mines on Lake Superior was an argument that had weight at Washington, both in connection with the 45-cent advance in ore prices granted in June and with the 25-cent advance which became effective on Oct. 1. Prior to the 10 per cent advance in wages made on Sept. 1, 1915, labor cost per ton of ore at the underground properties of one interest ranged from 60 cents to 75 cents per ton. There were three 10 per cent wage increases in 1916 and two in 1917. For 1918 there was one of 15 per cent on April 15, and one of 10 per cent became effective Aug. 1. These various increments, beginning with that of Sept. 1, make a total of 85 per cent, but as each percentage in turn was figured on a new higher base, the total has been 123 per cent, figuring back to the wages paid before Sept. 1, 1915. If the average labor cost per ton prior to this latter date be put at 65 cents, the present cost is thus \$1.46 per ton, or an increase of 81 cents.

Thus underground iron mining has been made to bear even a larger increase in labor cost than appears in steel works schedules. Taking common labor at steel works as the measure—and common labor has been advanced more than most skilled labor—the increase from \$2 a day in 1915 to \$4.20 which prevailed before the eight-hour day announcement of the Steel Corporation, is 110 per cent, as against 123 per cent on the showing made above for the deep mines of Lake Superior.

Liberty Bonds and Peace Drives

The hour of victory is often the time of danger. After having attained his immediate object, the victor is likely to rest on his laurels and neglect to make secure what he has accomplished. Hence it is that peril exists in the present international situation. The news from all of the battle fronts is so highly encouraging that the Allies have good reason for hoping that, following the collapse of Bulgaria, the surrender of Turkey and Austria will come quickly, but even in that event, Germany is almost certain to resist vigorously the invasion of her own territory and the victory of her enemies will not be complete until that is done. It is, therefore, a matter of the utmost importance to continue the war with the greatest possible force of men and munitions. If this is not done, an unsatisfactory settlement is certain. To prevent such a catastrophe, the greatest service that the people of the United States can render the world is to make the fourth Liberty Loan a tremendous success, one that will convince every nation of the earth that this nation will not stop fighting until the objects of the war are attained.

The great danger to-day is that as the prospect of the defeat of the Central Powers becomes probable, pacifism will again assert itself and many well-meaning people, longing for an ending of hostilities, will be ready to negotiate for peace with Germany on much more favorable terms for that empire than was the unconditional surrender of Bulgaria. That this is possible was shown recently in a most unexpected way by the action of

a great daily newspaper in advocating acceptance of Austria's proposition to discuss peace. If that paper, which has rendered service of the highest value to the Allies, could make such a misstep, many papers which had not so steadfastly advocated the war measures of the Government could not be expected to stay in the straight and narrow path and countless numbers of men and women, more or less tainted by pacifism, could not be trusted to insist upon utterly crushing autocracy before beginning to talk about peace.

Now is the time not only to subscribe for Liberty Bonds but also to get others to do so and especially to talk in opposition to discussing peace with Germany until the autocracy is obliterated. If a man is merely persuaded to buy a bond and still harbors false notions about peace, little is accomplished, but if he is not only induced to buy a bond but also to stand like a rock in opposition to anything resembling an inconclusive result of the war or a peace founded upon anything but justice, a really patriotic service will be rendered.

Growing War Steel Needs

From a superficial viewpoint it might seem that a closer fit between war requirements in steel and the supply is in prospect by reason of the various conservation measures being taken, but with the long range view it is evident that war requirements may grow so greatly as to make the relief afforded by conservation only temporary.

It is true that of late the principal efforts of the War Industries Board have been directed to saving steel at this and that point, rather than to putting more steel into particular products. It would appear, on the surface, that there is an effort to save steel without there being a new place to put it in. There has been too much experience with steel shortage, however, for the War Industries Board to have any occasion for uneasiness as to where steel is to be placed when found. Numerous investigations have been made, whether the output of shell steel exceeds the absorption by forging shops, whether ship steel is being furnished more rapidly than it can be put into hulls, whether the non-perishable foods cannot get along without tin cans, whether the country cannot get along with less steel pipe, and so on. Various conservation measures have been settled upon with makers of wares involving the use of steel, from clothes wringers to phonographs. The withholding of raw steel from unnecessary finishing operations may or may not develop a considerable tonnage. As to the conservation arrangements, a scrutiny of the list of manufactures limited for the remainder of the year indicates that as a whole they are not large tonnage items, from the iron and steel viewpoint. Perhaps after all the more important conservation effected in this connection will be conservation of labor, while there is the very important factor that such limitation of ordinary commercial operations increases the desire of shops to seek war orders.

After all, therefore, too much reliance must not be placed upon these steel conservation meas-

ures. Doubtless they will serve to lessen the gap between estimates of 17,000,000 to 19,000,000 net tons of finished rolled steel to be produced in the second half of this year, and 23,000,000 to 26,000,000 tons required, but even if they cause steel supply and requirements to break even, as of Dec. 31, they do not foreshadow any easier condition as to steel supplies in 1919.

In the first place, many of the war activities will require steadily increasing quantities of steel, month by month. If it is the case to-day—it is not stated that it is—that more shell steel is being produced than is being forged or otherwise worked, this does not mean that from the viewpoint of the war program too much shell steel is being made. It means that too little is being used. Our shell forging has considerably increased and machining will undoubtedly speed up.

Shipbuilding presents a similar case. Ship steel has accumulated, but if the shipyards had operated during the past six months at their present rate, the accumulation would have been less, and when they operate at their prospective rate a larger weekly supply than the present will probably be required. As to steel that is required for uses that are less regular, and for jobs that apparently need be done but once, the new requirements have for months past been presenting surprises and there is no precedent for assuming that uses not now thought of will not develop from time to time. Easily, therefore, the direct war steel demands may continue to grow, not merely for a few months, but for the duration of the war.

The great floating supply of steel in the country, moreover, has not been tested. It is a long journey from the merchant mill to the carpenter's brace and bit, although they may be needed in a shipyard, from the rod mill to the nail the farmer's barn may require, or the fence to keep the cows out of the corn. It is not known whether or not this floating supply is being seriously depleted, whether it may not be necessary a few months hence, in the interest of full industrial activity to augment it.

In the circumstances, whether or not at any particular time the prospects for full steel supplies appear improved, the one safe course is to husband every pound, to defer until after the war every bit of consumption that can possibly be deferred. Men's lives depend upon this conservation, and it cannot be too rigid.

Achievements of American Chemistry

German control of the chemical trade of the United States and perhaps the world has been ended. An impressive visual demonstration of this fact was afforded by the Fourth National Exposition of Chemical Industries in New York last week. One had only to compare it with the first one held four years ago to realize the really wonderful progress made. American chemists to-day occupy a position in the front rank of the world's research and industrial chemical engineering.

The fields in which marked progress has been made in the last four years are many. But prominent among these stand out the dye industry, based

on the by-product coke industry; the ferroalloy and metal industry; the new potash supplies and the explosives and poison gas developments. It is only a short four years ago that by-products of coke making were disposed of with difficulty and then only in forms of the first divisions of these products. To-day these derivatives of coal are being diverted to new manufacturing plants, involving millions of dollars, where they are being transformed by difficult chemical processes into the intermediates and other color products which formerly came from Germany. At the beginning of the world war only \$400,000 worth of dyestuffs were exported from the United States as compared with the \$17,000,000 estimated exports of the current year.

The marked expansion in the establishment of benzol recovery plants in the steel industry has aided not only the growth of the dye industry but has also made possible the supplying of the vast quantities of standard and new explosives for our army overseas as well as a surprising development in medicinal products, formerly imported. All these facts point to a good peace times return to the maker of coke.

The iron blast furnace bids fair to be an important source of potash. Chemical war developments have been such in this line that it is now predicted that Great Britain will be able to obtain enough potash from blast-furnace flue dust to equal her entire pre-war importations from Germany. And in the United States the statement is made that we now have sufficient furnace capacity to produce annually over 1,500,000 tons of potash per year, and that if only one-fifth of this capacity could be adapted to potash recovery, it would meet our potash needs without assistance from any other source. The situation in France is similar.

Chemical resourcefulness is also in a large measure responsible for our progress in ferroalloys and metals. And it is due to the chemist that our nitric-acid production has increased nine-fold. In the fixation of nitrogen alone the expansion in the American cyanamid industry has developed from virtually a negligible output in 1914 to 46,000 tons of nitrogen at the present time and a probable output of 91,000 tons in the spring of 1919. And German gas has been met with more gas.

So much for part of the achievements of the present. The future depends largely on the encouragement which the Government and others shall give to American chemists in financial and tariff safeguards. One great lesson of the war is that wastefulness must be checked. American chemists have in a striking way turned wastes into profit. They can do still more and the industries will be the beneficiary.

Fifteen day options have been taken on the property of the Sligo Iron & Steel Co. at Connellsville, Pa., by W. A. Warner of New York, representing a group of New York capitalists whose identity has not yet been announced. The Sligo Iron & Steel Co. is capitalized at \$750,000, of which \$500,000 is in common stock and \$250,000 in preferred. The plant is built upon 15 acres near Connellsville and has a capacity of 5000 tons of steel products per month. It is now engaged almost exclusively upon Government war contracts.

Abrasive Industry Growing

WASHINGTON, Oct. 1.—The artificial abrasive industry in the United States and Canada in 1917 almost trebled the value of the output of 1916. In the latter year, according to the report of the United States Geological Survey, which has just been issued, there were produced 28,806 short tons valued at \$2,935,909. In 1917 the prices mounted considerable, so that the 57,911 tons produced in that year represented a value of \$8,137,242.

The artificial abrasives considered in this report are of three kinds. Under the head of "metallic abrasives" are the products of the Pittsburgh Crushed Steel Co. of Pittsburgh. These include "diamond crushed steel" (crushed crucible steel), "angular grit" (crushed chilled iron), and "crushed cast iron." In 1916 this output totaled 1073 short tons valued at \$89,559. In 1917 it totaled 1125 tons valued at \$93,703.

The second group comprises the silicon carbides—carborundum, manufactured by the Carborundum Co. at Niagara Falls, N. Y.; crastolon, manufactured by the Norton Co. at Chippewa, Ont., and Blasdell, N. Y. The output of these in 1916 was 7025 tons valued at \$707,120. In 1917 they aggregated 8323 tons valued at \$1,074,152.

The largest group is that known as aluminum oxides. This includes alundum, manufactured by the Norton Co. at Niagara Falls, N. Y., and Chippewa, Ont.; aloxite, manufactured by the Carborundum Co. at Niagara Falls, N. Y., Niagara Falls, Ont., and Shawinigan, Que.; exolon, manufactured by the Exolon Co. at Blasdell, N. Y., and Thorold, Ont.; lionite, manufactured by the General Abrasives Co., Inc., at Niagara Falls, N. Y. Besides the firms just mentioned which manufactured abrasives in 1917, the D. A. Brebner Co., Ltd., and the National Abrasive Co. have plants at Hamilton, Ont., for the manufacture of aluminum oxide abrasives. The product of the Brebner Co. is named coralex. The output of this group in 1916 was 30,708 tons valued at \$2,139,230. In 1917 this increased to 48,463 tons valued at \$6,969,387.

Besides this output of artificial abrasives, the production of natural abrasives in the United States increased from \$1,664,339 in 1916 to \$2,135,602 in 1917. The importation of abrasives increased from \$555,850 in 1916 to \$812,303 in 1917. The total consumption of abrasive materials in the United States in 1916 was \$5,156,098 and in 1917 \$11,085,147.

Coal and Coke in 1917

Final figures as to the coal and coke output for 1917 compiled by C. E. Leshner, United States Geological Survey, show the estimate given in the department's advance bulletin and published in THE IRON AGE, Jan. 31, was substantially correct for the coke output but was about 6,000,000 tons under the official figure for the bituminous coal output due to the fact that the estimate was based on the number of carloads of coal loaded at the mines, whereas the average loading per car had increased nearly 4 per cent in the year. The production of bituminous coal in 1917 was 551,790,563 net tons, an increase over 1916 of 49,270,881 tons, or nearly 10 per cent. The number of men engaged in producing bituminous coal increased from 561,102 in 1916 to 603,143 in 1917. The average number of days worked was 243, the highest recorded.

The production of coke in 1917 was 55,606,828 tons, an increase compared with 1916 of 1,073,243 tons, or 2.0 per cent. The output of by-product coke increased from 19,069,361 tons in 1916 to 22,439,280 tons in 1917. The production of beehive coke decreased from 35,464,224 tons in 1916 to 33,067,548 tons in 1917. The number of active by-product ovens increased from 6607 in 1916 to 7298 in 1917, and of beehive ovens from 65,605 to 68,687, but the irregularity of operation of beehive ovens in 1917, due principally to lack of railroad cars, reduced the average production per oven. Nearly all the decrease in production of beehive coke was in Pennsylvania, although in the last month decreases were recorded in Georgia and Kentucky. Production of by-product coke decreased in seven states.

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Electric Muffle for Decalescent Point

A portable electric muffle, with pyroscopic detector, for use in determining the decalescent point of steel, is described in *Engineering*, London. In addition to being used in engineering establishments, it is being utilized also for the correct hardening of mine drills, for annealing various articles, etc.

The muffle consists of an inner cylinder and outer casing, separated by special heat-resisting lagging. The inner cylinder, of highly refractory material, is wound with a heating and magnetizing coil. The outer casing is wound with a coil of special enameled copper wire, to be connected in the galvanometer circuit. A compensator is provided for the purpose of balancing irregularities of voltage in the heating and magnetizing circuit in order to give a clear and steady reading of the galvanometer scale.

When a current is passed through the winding on the inner cylinder the muffle becomes heated, and it magnetizes any steel article placed inside it. Since the best temperature for quenching carbon steel is at its non-magnetic point, when this is reached a small current is automatically induced in the outer winding, the deflection of the galvanometer immediately notifying the operator that the best possible temperature for quenching has been attained. The best results can, therefore, always be arrived at, it is emphasized, irrespective of the carbon content of the steel, and there is no possibility of the steel becoming overheated.

A muffle having an internal chamber dimension of 12 in. by 4 in. takes 1400 watts to reach a temperature of about 1000 deg. C. On account of the heat-resisting qualities of the lagging used, the heat losses are reported to be small.

The muffle is manufactured under Wild-Barfield patents, by Automatic and Electric Furnaces, Ltd., 6 Old Queen Street, Westminster, London.

Eight-Hour Basic Day in the Steel Trade

Details Now Being Worked Out—Regarded as Yet
as a Wage Advance Only—Adopted by Pittsburgh
Employers in Foundry and Metal Working Lines

That the United States Steel Corporation's decision to adopt an 8-hr. basic day was quite unexpected by the steel trade generally is indicated by the fact that in the week which has followed the announcement operating officials are still awaiting light as to its application. Steel makers are not clear how it may be applied to operatives compensated on a tonnage basis, nor what will be the ruling among blast furnace workers, for example, who at periodic intervals in the change of turn commonly work over a period of 24 hr. It is not construed that such will be paid on the basis of regular rates for the first 8 hr. and one and one-half times those rates for the remaining 16. Not until receiving an informal communication on Monday were the producers generally aware that the plan does not comprehend the usual understanding with respect to overtime, namely, that work on Sundays and holidays is paid for at a double hourly rate. Instead, it appears to be the Steel Corporation's plan to pay time and one-half for Sundays and holidays just as for ordinary overtime work. A meeting of the general committee of the American Iron and Steel Institute was in session on Wednesday of this week, and it is not unlikely that the 8-hr. basic day will come up for consideration and that after this issue has been put to press an announcement may be forthcoming as to details late in the afternoon of Wednesday.

The net result is that steel makers are planning to meet the wage advance, which they regard the announcement to mean, but they are seeking light upon the details, and practically none of the independents have made announcements. The most important development of the week is that the 8-hr. basis has been accepted by iron and steel consumers, the effect of the Steel Corporation's stand permeating the industry quicker than many had expected. For example, following closely after the action of the Steel Corporation, the Employers' Association of Pittsburgh, representing approximately 400 firms of that district, unanimously adopted at an executive session a resolution recommending to all members the adoption of the 8-hr. basic day in all wage scales, beginning Oct. 1. It is estimated that 180,000 employees will get increased pay, due to the understanding that the plan provides for the 50 per cent increased rate for overtime. The employees benefited include those of the Westinghouse interests, including the Union Switch & Signal Co., the Westinghouse Air Brake Co. and the Westinghouse Electric & Mfg. Co., and the membership of the association includes the Mesta Machine Co., the A. Garrison Foundry Co., the Mackintosh-Hemphill Co. and the United Engineering & Foundry Co. Besides metal working and foundry employees, structural iron workers of association member concerns would come under the new measure of payment.

So far there is no disposition to talk of the plan of the Midvale Steel & Ordnance Co. and the Lukens Steel Co. to organize for employment representation, including the collective bargaining idea. On another page is outlined the plan which has been adopted by the officials and employees of the Midvale, Cambria and subsidiary companies.

Following is the text of the resolution adopted by the Employers' Association of Pittsburgh:

Resolved, that as an organization, the Employers' Association of Pittsburgh, does and hereby recommends to its constituent members and to all other employers, without reducing the present hours worked or changing the present hour rate,

1. The adoption of the basic eight-hour day in all wage scales, effective Oct. 1, 1918;
2. Believing that it is not only the desire of the majority of the employees, but to their best general interest as well, we recommend the adoption, where practical, of the Saturday

half holiday; but when the Saturday half holiday is adopted the time worked each day before overtime begins will be adjusted so as to aggregate 48 hours per week.

Various Wage Advances of the Steel Corporation

The action of the United States Steel Corporation in announcing the adoption of the 8-hr. basic day is equivalent to another advance in wages of from 10 to 16½ per cent and is the eighth advance in wages since Jan. 1, 1916, the previous advances being as follows: 10 per cent, effective Feb. 1, 1916; 10 per cent, effective May 1, 1916; 10 per cent, effective Dec. 15, 1916; 10 per cent, effective May 1, 1917; 10 per cent, effective Oct. 1, 1917; 15 per cent, effective April 15, 1918, and 10 per cent, effective Aug. 1, 1918. The Steel Corporation has been paying common laborers at the rate of 42c. per hour or \$3.36 per day of eight hours and under the new schedule it will pay \$3.36 for eight hours, \$4.62 for 10 hours and \$5.88 for 12 hours. Most of the laborers are now working 10 hours and receiving \$4.20. It is not expected that any employees will work a shorter time and the tendency may be to work even longer than at present. The number of laborers in the employ of the Steel Corporation is now about 300,000. The number shown by the annual reports for the years 1902 to 1917 inclusive, has been as follows:

Number of Employees, 1902 to 1918

1902.....	168,127	1908.....	165,211	1914.....	179,353
1903.....	167,709	1909.....	195,500	1915.....	191,126
1904.....	147,343	1910.....	218,435	1916.....	252,668
1905.....	180,158	1911.....	196,888	1917.....	268,038
1906.....	202,457	1912.....	221,025		
1907.....	210,180	1913.....	228,906		

The average salary or wage per employee per day of all employees, exclusive of general administrative and selling force, has been: 1912, \$2.68; 1913, \$2.85; 1914, \$2.88; 1915, \$2.92; 1916, \$3.29; 1917, \$4.10.

The average compensation, including general administrative and selling force, has been: 1912, \$2.75; 1913, \$2.92; 1914, \$2.97; 1915, \$3.01; 1916, \$3.36; 1917, \$4.16.

The announcement by Judge Gary was as follows: "The Finance Committee of the United States Steel Corporation to-day unanimously approved the recommendation of the chairman and president of the corporation and of the presidents of subsidiary companies to adopt the 8-hr. basic day, to become effective Oct. 1, 1918. The open shop plan heretofore in force throughout the works will be continued."

Views in Chicago

CHICAGO, Oct. 1.—The iron and steel mills without exception, so far as can be learned, will follow the lead of the United States Steel Corporation in the matter of the 8-hr. basic day, but it is generally agreed that establishing the 8-hr. day principle simply means that the actual working day will be adhered to and the men will receive time and a half for all time over the 8 hr. The scarcity of men precludes any other arrangements, in view of the fact that full production must be maintained.

Every opinion expressed by local officials concerning action to follow the Steel Corporation announcement of its adoption of a basic day of 8 hr. is that the lead of the Corporation will be followed as has always been done in wage advances. A question invariably raised in discussions of the subject is what will happen when the war ends and conditions begin to work toward normal.

Eight-Hour Day at Wisconsin Steel Plant

The Wisconsin Steel Co., operating three blast furnaces and a rolling mill, is an exception to the companies affected by the 8-hr. basis, for the reason that

Wisconsin some months ago established a system of 8-hr. shifts. Additional men were then engaged to permit running full, and those who worked 10 hr. were given the same pay as for eight. The furnaces also are operated by men working three shifts. The plan has proved satisfactory.

Corrections on Price Changes Announced Last Week

NEW YORK, Oct. 3.

Judge E. H. Gary, chairman, Committee on Steel and Steel Products of the American Iron and Steel Institute, has issued the following statement:

Referring to my statement dated Sept. 26, 1918, concerning certain changes and modifications in maximum prices, differentials, extras, etc., as heretofore recommended by the institute, it has been found that under the prices and differentials recommended to supersede those shown on page 38 of the institute pamphlet of August, 1918, the proper differential for foundry iron with silicon 1.00 to 1.75 was omitted. To correct this omission, please add the following as the first item to the table of silicon differentials for foundry iron:

Silicon 1.00 to 1.75.....\$0.50 under base.

It has also been found that there were certain omissions and errors in the table showing maximum selling prices from warehouse stock at various important points. To correct these omissions and errors, please make the following changes:

In front of all discounts on cold rolled steel, put a plus sign to indicate that the discount shown is to be added to the full list price, instead of deducted from it.

To all prices of galvanized barbed wire, add \$1 per 100 lb.

To all prices of cut nails add \$1 per 100 lb.

Change prices of cold rolled strip to read as follows:

New York City.....\$7.995	Cleveland.....\$7.92
Chicago.....8.02	Detroit.....7.98
Boston.....8.02	Buffalo.....7.92
Philadelphia.....7.98	St. Louis.....8.09
Cincinnati.....7.98	San Francisco.....9.00

On merchant boiler tubes, lapwelded, steel, put a plus sign in front of all discounts on sizes 1½ in. to 2 in. O. D.; also under San Francisco prices put a plus sign in front of the 8 per cent discount for 2½ in. O. D.; and in front of the 10 per cent discount for 2½ in. to 3½ in. O. D.

Under merchant boiler tubes, charcoal iron, put a plus sign in front of all discounts shown.

All warehouse prices will vary with changes in freight rates, and revised prices due to such changes will be effective on and after effective date of new freight rates.

It was incorrectly stated in THE IRON AGE last week that the new price for gray forge iron is \$32, f.o.b. Pittsburgh. This should have read \$33, there being a differential of \$1 below the price for No. 2 foundry. There was also an error in stating the price for Northern semi-cold blast charcoal iron to be \$70, f.o.b. furnace. Taking \$34 as the base and adding the new differential of \$37 gives a price at furnace of \$71.

The entire plant of the Anheuser-Busch Brewing Association, at St. Louis, which will be put out of business by the Government's restriction of beverage production, has been offered to the Government for the manufacture of war munitions by the president, August A. Busch, on the Government's own terms. If the plant is not taken as offered, President Busch announces that the plant will become a munitions plant immediately upon the cessation of beer brewing, and devoted to the production of small arms ammunition, etc. The plant has 15,000 hp. boiler capacity, can generate 13,000,000 kw.-hr. of electrical energy annually, has seven miles of railroad track with engines and cars, etc., as well as about 4000 employees, most of whom can be turned into the operation of the munitions plant. The plant adjoins the United States Arsenal at St. Louis and also the Busch-Sulzer Bros.-Diesel Engine Co.'s plant, owned by the Busch interests, which is turning out a submarine engine each week for the Government.

TO CONSERVE PIG IRON

Producers Are Requested to Obtain Pledges from Their Customers

Because of the increasing scarcity of pig iron and the desire to further conserve the supply for essential demands, the pig iron producers have been asked to secure from their consumers a pledge that the iron be used only for essential purposes and that the consumers secure similar pledges from their own customers, covering the products into which the iron is to go. A few blast furnace interests have previously required this pledge from their consumers, but this practice has not been general. Letters requesting the securing of these pledges were sent out to the pig iron producers Sept. 28 by H. G. Dalton, chairman of the Pig Iron, Iron Ore and Lake Transportation Sub-Committee, in conformity with action taken at a meeting of the pig iron producers held recently in New York. Mr. Dalton's letter is in part as follows:

"It is imperative that every manufacturer, jobber and retailer of iron and steel products should fully realize and make his salesmen and customers realize that his attitude toward his trade is exactly the reverse of that in normal times. It requires no salesmanship merely to sell goods where the demand greatly exceeds the supply, but it does require real salesmanship and a high degree of patriotism to sell with discrimination, with a view of limiting the purchases to strictly essential uses, the controlling consideration being: Where can these stocks be best placed in the public interest?"

"While the several divisions of the War Industries Board are anxious to assist you, and will not hesitate as occasion may require to direct you, this nevertheless is *your* problem. With confidence we look to you for such policing of the distribution of iron and steel products as will insure each pound being applied *only* to essential uses.

"The pledge suggested by the War Industries Board is as follows:

We do hereby pledge ourselves not to use, or as far as lies within our power, permit the use of any stocks now in or which may hereafter come into our possession or control, save (1) for essential uses, as that term may be defined from time to time by the Priorities Division of the War Industries Board, or (2) under permits in writing signed by the Director of Steel Supply; that we will make no sale or delivery from such stocks to any customer or retailer before his filing with us a similar pledge in writing; and that we will use our utmost endeavor to prevent the hoarding of stocks, and to insure that they may be distributed solely for essential uses.

"At the pig iron producers' meeting it was left with the undersigned to communicate with each producer of pig iron and request him to obtain from each of his customers (if he has not already done so) a pledge of this kind, and on any new order or allocation with concerns who have not made a pledge to him, to obtain same at the time of entering the order. Pledges so obtained to be kept by the producer. Please notify the undersigned of any consumer refusing to give a pledge.

"You doubtless were represented at the meeting in Mr. Replogle's office in Washington, on Monday, Sept. 23, at which time the urgent necessity for increased production of pig iron was made plain. We must have a larger production of pig iron if we are to fulfil the Governmental needs. To paraphrase an old saying: 'A ton of pig iron saved is a ton produced.' We therefore urge your earnest attention to this matter, and a prompt compliance with this request.

"As stated by the War Industries Board: 'This duty is personal to you, and cannot be avoided or delegated to your friends and neighbors.'

The United Alloy Steel Corporation, Canton, Ohio, will open a sales office in Cleveland. This will be at 614 Swetland Building and will be in charge of I. J. Shults, who for some time represented the company in Syracuse, N. Y. Chester R. Williams has been placed in charge of this corporation's Chicago office, with which he has been associated.

Iron and Steel Markets

THE EIGHT-HOUR BASIC DAY

Steel Makers Wait on Details of the Steel Corporation's Plans

Eastern Freight Rates Up 10 Per Cent Nov. 1—
Woodward Plant Abandoned

The item of transcending interest is how the 8-hr. basic day, adopted by the Steel Corporation, will be applied and how far through the iron and steel industrial fabric its effect will be felt. As yet no details are forthcoming as to how the 10 to 16 2-3 per cent wage increase, which it means at the present time, will be applied to employees compensated on a tonnage basis or to those, as in blast furnace plants, who remain for 24-hr. periods of work in a change of turn, but it has been ascertained that in Corporation plants the one and one-half rate for overtime will apply also to Sunday and holiday work, instead of a double rate. Steel makers generally have made no announcements, as they are waiting for information on the details. A meeting of the general committee of the American Iron and Steel Institute on Wednesday will probably take up the subject and possibly an announcement may be expected late Wednesday afternoon after this issue has gone to press.

The far reaching influence of the decision has been proved quicker than expected, if the recommendations of a manufacturers' association in Pittsburgh may be taken as an indication. There the 8-hr. basis is accepted, but a 48-hr. week for machine shop and foundry operatives is demanded before overtime rates apply if, as also recommended, a Saturday half-holiday is established.

Meanwhile, the shortened measure for wage calculations adds a further handicap to the class 3 steel producers, representing about one-eighth more in their labor costs and coming immediately after the advance in pig iron, their raw material. As no increase in finished steel prices was granted by the War Industries Board, and relief to avoid unprofitable manufacture is to be provided within the industry, there is the greater possibility that assistance may be asked of the producers' committee appointed for the purpose. Apparently each case, should any develop, will be considered by itself with no general plan cut out for all.

By Nov. 1 there will be higher prices to New England and generally to points east of Pittsburgh through an advance in freight rates. These are due partly to a transfer from commodity rates to classified rates and partly because of an alleged inequality between Central West and Pittsburgh rates to the East. They cover pig iron and semi-finished and finished steel. The advance will amount roughly to 10 per cent and will of course affect consumers of steel and of pig iron, including again the class 3 steel makers.

That no great stir has been occasioned by the considerable advance in pig iron, \$4 and more at some consuming points, is due to the fact that so large a percentage is allocated and sellers are not in search for a market; otherwise an interesting new alignment of competitive areas would be established.

A step forward has been made in the distribution of pig iron to sub-contractors of essential manufactures through a provision allowing pig iron makers to ship on a pledge that the iron is to be put to a direct or indirect war use.

While cast-iron pipe manufacturers are pleased to receive the advance of \$5 per ton allowed, most of it will be absorbed in the higher cost of pig iron in those sections where the supplying furnace sells on a Pittsburgh basis, though considerably distant, as in eastern Pennsylvania.

Steel output in September with two days less has exceeded that of August. A marked improvement in the quality of coke is reported and some headway is thus being made on the pledge of the trade to increase output 10 per cent. The Carnegie Steel Co. maintained this week its 92 per cent of furnace capacity in blast last week and its rate of ingot production was 97.8 per cent against 97.5 per cent for the previous week. The industry enters October, always a good month, under generally auspicious conditions.

The straining to secure maximum steel production is shown by the retrenchments ordered at the recent session of producers with the steel division of the War Industries Board, some of the specific items being calculated, as in the matter of bicycle production and cutlery making, to save not more than a few thousand tons in each case.

Although it may have no connection, it is interesting at least that at the time when signal successes have been won at the fighting fronts, the War Industries Board has decided not to extend aid to the Woodward Iron Co. in building the self-contained steel mill projected at Woodward, Ala. The specific reason reported is a lack of pressure in demand for ship shapes. Two or three other projects aiming at increasing pig iron capacity, but clearly requiring months before reaching a producing basis, have similarly not been looked upon with favor.

Pittsburgh

PITTSBURGH, Oct. 1—(By Wire).

While the revisions in iron ore, pig iron and steel prices that become effective on deliveries to-day are very important, they represent in the aggregate only a small change in the general price structure. The principal finished steel products are unchanged in price, and the changes that are made in differentials, etc., are minor in character. By far the most sweeping changes are those made in pig iron, the basis price of practically all grades of pig iron except Bessemer

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Oct. 1 1918	Sept. 24 1918	Sept. 3 1918	Oct. 3 1917
No. 2 X Philadelphia....	\$38.85	\$34.40	\$34.40	\$34.25
No. 2 Valley furnace....	34.00	33.00	33.00	33.00
No. 2 Southern, Cincinnati	37.60	36.60	36.60	....
No. 2 Birmingham, Ala....	34.00	33.00	33.00	....
No. 2 furnace, Chicago*	34.00	33.00	33.00	....
No. 2 deliv., eastern Pa....	36.00	32.90	32.90	....
Basic, Valley furnace....	33.00	32.00	32.00	33.00
Bessemer, Pittsburgh....	36.60	36.60	36.60	37.25
Malleable Bess., Ch'go*	34.50	33.50	33.50	....
Malleable, Valley.....	34.50	33.50	33.50	....
Gray forge, Pittsburgh....	34.40	33.40	33.40	....
L. S. charcoal, Chicago....	38.85	37.85	37.85	....

Rails, Billets, Etc., Per Gross Ton:	Oct. 1 1918	Sept. 24 1918	Sept. 3 1918	Oct. 3 1917
Bess. rails, heavy, at mill.	55.00	55.00	55.00	....
0-h rails, heavy, at mill.	57.00	57.00	57.00	....
Bess. billets, Pittsburgh..	47.50	47.50	47.50	....
0-h billets, Pittsburgh....	47.50	47.50	47.50	....
0-h sheet bars, P'gh....	51.00	51.00	51.00	....
Feeding billets, base, P'gh.	60.00	60.00	60.00	....
0-h billets, Phila.....	51.30	51.30	51.30	....
Wire rods, Pittsburgh....	57.00	57.00	57.00	....

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia....	3.73	3.73	3.73	....
Iron bars, Pittsburgh....	3.50	3.50	3.50	....
Iron bars, Chicago.....	3.50	3.50	3.50	....
Steel bars, Pittsburgh....	2.90	2.90	2.90	....
Steel bars, New York....	3.145	3.145	3.145	....
Tank plates, Pittsburgh....	3.25	3.25	3.25	....
Tank plates, New York....	3.495	3.495	3.495	....
Beams, etc., Pittsburgh....	3.00	3.00	3.00	....
Beams, etc., New York....	3.245	3.245	3.245	....
Skelp, grooved steel, P'gh.	2.90	2.90	2.90	....
Skelp, sheared steel, P'gh.	3.25	3.25	3.25	....
Steel hoops, Pittsburgh..	3.50	3.50	3.50	....

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Oct. 1 1918	Sept. 24 1918	Sept. 3 1918	Oct. 3 1917
Sheets, black, No. 28, P'gh	5.00	5.00	5.00	....
Sheets, galv., No. 28, P'gh	6.25	6.25	6.25	....
Wire nails, Pittsburgh....	3.50	3.50	3.50	....
Cut nails, Pittsburgh....	4.00	4.00	4.00	....
Fence wire, base, P'gh....	3.25	3.25	3.25	....
Barb wire, galv., P'gh....	4.35	4.35	4.35	....

Old Material, Per Gross Ton:

Carwheels, Chicago.....	\$29.00	\$29.00	\$29.00	\$24.00
Carwheels, Philadelphia..	29.00	29.00	29.00	29.00
Heavy steel scrap, P'gh....	29.00	29.00	29.00	33.00
Heavy steel scrap, Phila..	29.00	29.00	29.00	25.00
Heavy steel scrap, Ch'go..	29.00	29.00	29.00	27.00
No. 1 cast, Pittsburgh....	29.00	29.00	29.00	30.00
No. 1 cast, Philadelphia..	29.00	29.00	29.00	28.00
No. 1 cast, Ch'go, net ton.	30.34	30.00	30.00	21.00
No. 1 RR. wrot., Phila....	34.00	34.00	34.00	43.00
No. 1 RR. wrot., Ch'go, net	30.34	29.75	29.75	30.00

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt....	\$6.00	\$6.00	\$6.00	\$6.00
Furnace coke, future....	6.00	6.00	6.00	6.00
Foundry coke, prompt....	7.00	7.00	7.00	....
Foundry coke, future....	7.00	7.00	7.00	....

Metals, Per Lb. to Large Buyers:

	Cents	Cents	Cents	Cents
Lake copper, New York....	26.00	26.00	26.00	23.50
Electrolytic copper, N. Y.	26.00	26.00	26.00	23.50
Spelter, St. Louis.....	9.65	9.30	9.25	8.12 1/2
Spelter, New York.....	9.40	9.65	9.50	8.37 1/2
Lead, St. Louis.....	7.75	7.75	7.75	7.82 1/2
Lead, New York.....	8.05	8.05	8.05	7.95
Tin, New York.....	82.00	79.00	83.00	60.50
Antimony (Asiatic), N. Y.	14.00	13.87 1/2	14.00	15.00
Tin plate, 100-lb. box, P'gh.	\$7.75	\$7.75	\$7.75	....

being advanced \$1 a ton, while on account of the rearrangement in basing points the advance is much larger on pig iron made in Tennessee, Virginia and Eastern Pennsylvania. The iron ore advance of 25c. per ton applies only to Lake Superior ores and affects deliveries on and after to-day. As a rule, the delivery point for Lake Superior ore is regarded as Lake Erie dock.

Class 3 steel producers, who buy their pig iron, are adversely affected by the price revision for the fourth quarter, as they will have to pay at least a dollar a ton more for their basic pig iron and do not receive any material advantage at any point.

Efforts of the War Industries Board to conserve steel are unabated. Last week announcement was made as to agreements reached with many manufacturing consumers of steel whereby they would limit their operations until the end of the year by certain percentages, as compared with their operations in the same period last year, and it is understood that the board is continuing such negotiations with other steel consumers. Even when agreements of this character are reached, there is no automatic releasing of steel to be shipped to such consumers. Some mills report that they still await permission to ship to automobile makers steel that they have already manufactured or have in process of manufacture, even though this steel would be needed to enable the automobile makers to carry out their agreement as to restriction of output for the remainder of the year. Study is still being made of the amount of steel that is being consumed by the various finishing departments of the steel industry in the hope of finding quarters in which some steel can be saved. The supplies of steel have already been so curtailed that it is difficult to compass any further curtailment. For instance, the jobbers are furnishing considerable tonnages of material for war work which, if ordered from the mill, would probably be given a class A priority whereas the jobbers' replacement material is given B-4 priority rating. If production were so curtailed that mills could not ship B-4 priorities, this war

demand would immediately seek priority ratings for direct mill shipment and nothing would have been gained. Recent rearrangements in the distribution of shell steel tonnage are working out now, whereby a few mills are rolling less shell material and putting the steel into other lines, particularly rails, while at many other mills the rolling of shell steel is increasing. The chief products in which the War Industries Board wants larger tonnages at present are rails and shell steel. A few mills have compiled preliminary figures of their production in September and all the reports thus far prove very satisfactory, the reports showing an increase in tonnage over August, although September had two working days less. One large interest shows an increase of about 7 per cent in ingot output, two-thirds of the gain being scored in the first half of the month, which compared with the very hot period in August. The Carnegie Steel Co. is now producing ingots at 98 per cent of rated capacity, which is considered a very good pace in view of the shortage of scrap of good quality.

Pig Iron.—The Carnegie Steel Co. is to-day blowing out one of its medium-sized blast furnaces for relining, but within about 30 days it will be able to blow in one of the two Edgar Thomson furnaces which have been having their stock bins rebuilt and their level raised above possible flood-level. Many furnaces now report that they notice a distinct improvement in the quality of coke received and attribute this to the efforts the Fuel Administration has been making for about six weeks past to bring about the production of better coke. The tonnage output of coke is satisfactory on the whole, the chief complaint being as to the quality. Pig iron production is expected to show a decided improvement for September over the rate shown in August, and October is expected to bring better results still. The pig iron price revision effective to-day makes an advance in practically all grades of pig iron of \$1 a ton, with the exception of Bessemer, but does not alter prices in other respects as long as consumers get their iron from the usual sources. If consumers are allocated any Vir-

ginia or Tennessee iron, they will have to pay more for it than formerly, as the price will be based on Birmingham instead of at furnace. Nothing definite has been done yet as to providing pig iron for the semi-steel shells the Ordnance Department is urging foundries to undertake, and it appears that the methods of manufacture are not yet sufficiently well defined to bring this matter to a head. W. P. Snyder & Co. announce their usual pig iron averages, showing that Bessemer was \$35.20 and basic \$32 at Valley Furnaces during the month.

Basic pig iron, \$32; Bessemer, \$35.20; gray forge, \$32; No. 2 foundry, \$33; No. 3 foundry, \$32.50, and malleable \$33.50, all per gross ton at Valley furnace, the freight rate for delivery in the Cleveland and Pittsburgh district being \$1.40 per ton.

Billets and Sheet Bars.—No transactions of importance are reported in billets or sheet bars and there have been scarcely any allocations. There are rumors of some rearrangements in ingot contracts, the price of ingots not being controlled. Production of sheet bars has been materially decreased, the greatest cut being at the Edgar Thomson steel works, where it is necessary to make more rails. Shipments of sheet bars to sheet mills have been running somewhat lighter the past fortnight, while shipments to tin plate mills are undergoing a larger curtailment.

We quote 4 x 4 in. soft Bessemer and open-hearth billets at \$47.50, and bars \$51, forging ingots \$73, and forging billets \$60 base, all f.o.b. at mill, Pittsburgh or Youngstown.

Plates.—The War Industries Board has approached several steel mills with a view to ascertaining whether they can increase their output of plates and, if so, what finished steel products the steel would be taken from in such an event. While there has been an investigation to determine whether more plates are being shipped for shipbuilding than there is prospect of consuming promptly, there is evidently no definite program of saving steel by curtailing plate output, but rather the reverse. There are fairly heavy plates deliveries to steel car shops. We quote sheared plates at 3.25c. at Pittsburgh mill for fourth quarter.

Ferroalloys.—Activity in ferromanganese has increased and several contracts for first half have been made, while there remains some inquiry in the market. The established practice now is to charge \$3.50 per unit for ferromanganese running above 70 per cent. For a time the effort was made to secure \$4. The present price for additional units represents a slightly higher basis for the manganese than when the regular price of \$250 is paid for 70 per cent, for the reason that for each extra unit of manganese that is furnished there is about one unit less of iron and the iron itself is worth about 35c. a unit.

We quote 70 per cent ferromanganese at \$250 delivered, 16 per cent spiegeleisen at \$75 at furnace and 50 per cent ferrosilicon for prompt shipment at \$160 and for delivery over the last half of the year, \$150 to \$155 at furnace, the furnaces usually absorbing the freight.

We quote 9 per cent Bessemer ferrosilicon at \$55; 10 per cent, \$57; 11 per cent, \$60.30; 12 per cent, \$63.60. We quote 6 per cent silvery iron, \$42; 7 per cent, \$43; 8 per cent, \$45.50; 9 per cent, \$47.50; 10 per cent, \$50. Three dollars per gross ton advance for each 1 per cent silicon for 11 per cent and over. All the above prices are f.o.b. maker's furnace, Jackson or New Straitsville, Ohio, these furnaces having a uniform freight rate of \$2.90 per gross ton, for delivery in the Pittsburgh district.

Structural Material.—The structural mills continue working at about the same rate as formerly, their product being entirely for war use. Present orders will carry the mills for several weeks still at the present rate of output.

We quote beams and channels up to 15 in., at 3c. at mill, Pittsburgh, for third quarter.

Sheets.—Sheet mill operations have undergone rather a sharp decrease in the past week or two and do not average much above 50 per cent of capacity. The curtailment is due entirely to shortage in sheet bar supply and it is a question whether any improvement in the supply can be effected. The restrictions the War Industries Board has been arranging in the production of various wares in which sheets are used is operating to decrease the commercial demand, but it is doubtful whether there will be enough tonnage to meet even

the restricted demand. A few minor changes in differentials and classifications have been made, as shown on page 759 of THE IRON AGE last week. Prices on sheets are given in detail on page 865.

Tin Plates.—Receipts of sheet bars by the tin plate mills have already shown a decrease as a result of the order made a month ago whereby there was to be a 30 per cent restriction for the fourth quarter, and mills will operate at less than 90 per cent of capacity this week. If the Food Administration continues its efforts to limit the amount of tin plate to be used by the packers of non-perishable foods, it will not be necessary for the tin plate mills to operate at even 70 per cent of capacity during the fourth quarter, on account of the few uses to which it will be permissible to put tin plate. At present no tin plate is allowed to be used except for packing food products, and even dried beans are excluded from the category unless they contain so much moisture that they would not keep. We quote tin plate at \$7.75 per base box for fourth quarter delivery. Prices onterne plates are given on page 865.

Iron and Steel Bars.—Operations at merchant mills continue irregular, depending entirely on the war orders on hand, and there are considerable variations from week to week. Only very limited tonnages of steel bars are available against class B priorities, and shipments to jobbers are somewhat less than the quotas called for. Iron bars are in fairly good supply, as war orders engage a smaller proportion of the mill capacity than is the case with steel bars.

We quote soft-steel bars rolled from billets at 2.90c.; from old steel rails, 3c.; and refined iron bars at 3.50c., at mill, Pittsburgh, for third quarter.

Cotton Ties.—No change in the base price of cotton ties was made for last quarter and the price for October delivery is, therefore, \$1.96. On account of weather damage to the cotton crop a few weeks ago the cotton tie requirements for the season are proving less than anticipated.

We quote cotton ties for October shipment at \$1.96 per bundle of 45 lb., f.o.b. Pittsburgh.

Shafting.—The demand for the larger sizes of cold-finished shafting has been active, but deliveries are prolonged because of the poor supply of material from the mills. Practically the entire output of cold-finished shafting is going for Government requirements, the larger sizes being machined to shell and shell parts. On the smaller sizes deliveries are easier, largely because most of this stock was used by the automobile trade as screw stock. With this trade gradually going out of the market, because of enforced curtailment of the industry, the supply temporarily is easier, although there is very little hope of non-essential industries getting materials, as the Government is watching steel supply to shafting manufacturers, both ways, seeing that they do not get more material than they have priority orders for the finished articles.

For third quarter we quote cold-rolled shafting at 17 per cent off list in carloads and 12 per cent in less than carloads, f.o.b. Pittsburgh.

Rivets.—There is a very brisk demand for rivets and manufacturers are taking on nothing but Emergency Fleet, Navy and other Government requirements, which have been unusually heavy. The labor scarcity is the only thing working against 100 per cent operation.

We quote butthead structural rivets at \$4.40, conehead boiler rivets at \$4.50 per 100 lb. Small rivets are 50 and 1# per cent off list for third quarter, f.o.b. Pittsburgh.

Nuts and Bolts.—The pressing urgency of Government requirements is pushing mills to the limit, and they are taking on practically nothing but Government work. The only new construction work requiring this class of material is either on Government warehouses propositions or mill and factory extensions. Government prices have been reaffirmed and are given on page 865.

Spikes.—Railroads are pressing spike makers for material required for maintenance and upkeep work during the last quarter, and while no specific tonnage contracts have been made during the past week, mills have promised to take care of the roads on standard spikes. Because of mine development work, mills are

swamped with orders for small spikes, and one local maker is entirely out of the market.

Standard sizes of railroad spikes 9/16 x 4 1/2 in. and larger, \$3.20 per 100 lb. in lots of 200 kegs of 200 lb. each, or in larger lots. Boat spikes, \$5.25 per 100 lb.; rack bolts, \$4.20 base in lots of 200 kegs or more; less than 200 keg lots, \$1 per 100 lb. extra. All f.o.b. Pittsburgh.

Boiler Tubes.—Supplementing the usual very heavy demand of the Navy and Emergency Fleet for boiler tubes, the War Department is also a big buyer on the heavier sizes made as a specialty to be used in the manufacture of trench mortars. The regular trade is getting only the excess from Government requirements. The jobbers' end of the boiler tube business, because of Government priority regulations, is very small. Discounts on boiler tubes are given on page 865.

Hot-Rolled Strip Steel.—Mills are operating close to 50 per cent of capacity and are seriously handicapped by the steel shortage in cases where the mills buy their billets or slabs in the open market. Practically all shipments are on A and B classifications and there is almost no class C or permit shipments. Automobile users of hot-rolled strip steel are working strictly in conjunction with the War Industries Board on production and are diverting their labor to essential war requirements and a large part of their stamping and drawing capacity is now on artillery spoke shoes and booster cases for shells. Former users of blue annealed sheets are experiencing difficulty in getting this material and are turning to hot-rolled strip and find it a good substitute, true to gage and of better drawing qualities.

We quote hot-rolled strip steel at \$3.50 per 100 lb., Pittsburgh, for third quarter, 50c. additional being charged per 100 lb. for special stamping quality.

Cold-Rolled Strip Steel.—The price changes announced by the American Iron and Steel Institute committee were welcomed by the mills which for several months have complained of the narrowing margin of profit. The new prices eliminate the freight allowance and grant an increase of 35c. per 100 lb. on the boxing charge. The new prices became effective Sept. 24.

We quote cold-rolled strip steel at \$6.50 base per 100 lb., f.o.b. Pittsburgh, for 1 1/2-in. and wider, 0.100 in. and thicker, hard temper in coils under 0.20 carbon. Boxing charge 50c. per 100 lb.

Wire Rods.—Production of wire rods, which recently dropped to an average of 50 per cent of capacity, is gradually being decreased further as mills become able to put more of their steel into shell rounds. There is some Government business in sight in rods, but by far the major portion of the rod output is for wire drawing and chain manufacture, demands for the latter purpose being heavy. Prices on rods for fourth quarter are given on page 865.

Wire Products.—Contrary to early reports, no change in base prices on barb wire were made for the fourth quarter, but the wording is changed somewhat and an extra of 15c. per 100 lb. is provided for special weights or packing. Cut nails are advanced from \$4 to \$5 per keg while wire nails are unchanged. The jobbers' differential on both cut and wire nails is reduced from \$1 to 50c. per keg and some of the jobbers express surprise at this action. Some confusion has been caused in the trade that priority orders for nails are not required. It is quite true that it is not necessary to have a priority order to authorize a mill to enter an order for nails, for as a matter of fact that is the case with all steel products, but it does require a priority order to make it probable that any shipment will be made. Prices on wire products for fourth quarter are given on page 865.

Hoops and Bands.—Production is proceeding at not over 50 per cent of capacity and is likely to be curtailed further. Demand, however, is light. Hoops and bands remain on the basis of 3.50c. for fourth quarter.

Wrought Pipe.—Efforts of the War Industries Board and the pipe mills relative to the possibility of curtailing the output of standard steel pipe in order to divert steel to other uses are to be continued. It is pointed out that the mills did not succeed in completing shipments of jobbers' quotas for August until the fore part of September and the September quotas proved larger, so

that it is still more difficult to make up these shipments which carry a B4 priority. If the production of pipe were restricted so as to cut out that degree of priority, it would eventually throw upon the mills a considerable tonnage of direct war orders which the jobbers are now filling and it is more convenient to have this business go through jobbers than to have it go direct. Discounts on iron and steel pipe are given on page 865.

Old Material.—Some scrap consumers report that offerings of scrap are slightly increased but on the whole there is no material change. A larger outcome of railroad material is expected before winter, as the railroads are laying a great many new rails and are also scrapping cars more freely than for months past. Most of the material is expected to go direct to consumers. Dealers are doing still less business than they were before their attention was called to violations of regulations relating to the so-called unguaranteed low phosphorus scrap. There were rumors that this grade might be eliminated when iron and steel prices were set for the fourth quarter of the year, but no change whatever has been made in the scrap regulations thus far. We quote:

Heavy steel melting scrap, Steubenville, Folsom, Brackenridge, Monessen, Midland and Pittsburgh, delivered	\$29.00
No. 1 cast scrap (for steel plants)	29.00
Re-rolling rails, Newark and Cambridge, Ohio, Cumberland, Md., Franklin, Pa., and Pittsburgh	34.00
Hydraulic compressed steel scrap	29.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	\$27.50 to 29.00
Bundled sheet stamping scrap	22.00 to 23.00
No. 1 busheling scrap	28.00 to 29.00
Railroad grate bars	18.00 to 19.00
Low phosphorus melting stock (unguaranteed) ..	34.00
Low phosphorus melting stock (guaranteed) ..	36.50
Low phosphorus melting stock (bloom and billet ends, heavy plates)	39.00
Iron car axles	46.00 to 46.50
Locomotive axles, steel	46.00 to 46.50
Steel car axles	46.00 to 46.50
Railroad malleable (for malleable works) ..	34.00
Machine shop turnings	19.00
Cast iron wheels	29.00
Roller steel wheels	36.00
Sheet bar crop ends (at origin)	35.00
Cast iron borings	19.00
No. 1 railroad wrought scrap	34.00
Heavy steel axle turnings	24.00
Heavy breakable cast scrap	28.00 to 29.00

Coke.—Reports are that the better coke is being made in the Connellsville region as a result of efforts of the Fuel Administration which were directed at both miners and operators. The chief complaint as to miners was that they were mining dirty coal. Last week the Carnegie Steel Co. put in operation the seventh battery of by-product coke ovens at Clairton, one battery containing 64 ovens, so that there are now 448 ovens in operation at the plant. Three more batteries will probably be completed and put in operation during the next four or five weeks, making the full original complement of 640 ovens. Additional ovens are under construction, but will not be ready for many months. The Fuel Administration has been endeavoring to find by-product coal to ship to the Clairton plant in order to permit of more Connellsville coal remaining in the region to swell the output of beehive coke, but thus far it has not been possible to divert much coal and nearly all the coal used at Clairton is coming from the Lower Connellsville region, chiefly by water. Lower Connellsville coal is used in preference to old basin coal because it is much higher in volatile elements and therefore makes more toluol and sulphate of ammonia. The Clairton plant is now operating on 19-hr. coking time, each battery of 64 ovens using about 1000 tons of coal a day and producing about 650 net tons of coke, the coke yield being relatively low on account of the high volatile coal used. Sales of foundry coke in the open market have recently been curtailed by the Fuel Administration because it was considered desirable that the supply of coke for furnace use be increased. Output of coke in the Connellsville and Lower Connellsville region in the week ended Sept. 21 was 339,475 tons, a decrease of 8855 tons from the preceding week.

We quote 48-hr. blast-furnace coke at \$6; 72-hr. foundry, \$7, and crushed coke over 1/2 in. at \$7.30, all in net tons of 2000 lb. at oven.

Chicago

CHICAGO, Sept. 30—(By Wire).

All rollings are subordinated to those which produce shell steel, ship and car plates and standard rails. It is understood that the Government will divert rails from the Bethlehem Steel Co. and have them rolled by the Carnegie Steel Co. because of the lower costs at which the latter can manufacture rails. There is some talk of restricting operations on Class 2-A priority orders to give those of more importance a clear track, but no orders have been issued to that end. The demand for the smaller sizes of shell is extremely heavy.

The pig iron trade appears to be well satisfied with the plan of having Pittsburgh and Birmingham as basing points with producers west of the Alleghanies and north of the Ohio River selling at furnace, believing that it will operate to help the stacks which need help.

Pig Iron.—The generally expressed opinion is that the new system of basing points is fair and will work out very well. It is conceded that the furnaces most benefited are those most in need of relief. It is not believed the plan will have much, if any, effect on the geographical distribution of iron, as the need is so great that the price does not figure to any great degree. So far as the market is concerned, the announcement of last week has made but little change. Sales agents were hoping that they would be permitted to make some offerings when prices were fixed for the fourth quarter, but at least two southern furnaces have repeated that they cannot authorize their representatives to take on any new business. The new basing arrangement adds to the complexities of billing, but this is a minor matter. War work is being cared for to the full extent, but not much iron is being placed for the future. Less high sulphur iron is coming out than has been the case of late.

The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable and steel-making irons, including low phosphorus, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	\$38.70 to \$39.00
Northern coke foundry, No. 1, silicon, 2.25 to 2.75	35.25
Northern coke foundry, No. 2, silicon, 1.75 to 2.25	34.00
Northern high-phosphorus foundry	34.00
Southern coke, No. 1 foundry and No. 1 soft, silicon, 2.75 to 3.25	42.00
Southern coke, No. 2 foundry, silicon, 2.25 to 2.75	40.25
Southern foundry, silicon, 1.75 to 2.25	39.00
Malleable, not over 2.25 silicon	34.50
Basic	33.00
Low phosphorus (copper free)	54.00
Silvery, 7 per cent	48.45

Ferroalloys.—Considerable pressure to sell ferromanganese is reported. A local producer has closed with a car wheel interest for around 500 tons of 30 to 40 per cent spiegeleisen. The price is not reported, but it is understood to have been below recent quotations.

We quote 70 per cent ferromanganese at \$250, delivered; 50 per cent ferrosilicon at \$150 to \$160, delivered, and 16 to 18 per cent spiegeleisen at \$75, furnace.

Plates.—The Government continues to press the mills to the limit and there is some talk of official restriction of 2-A priorities, which would mean concentration on higher priorities.

The official mill quotation is 3.25c., Pittsburgh, the freight to Chicago being 27c. per 100 lb. Jobbers who have stock quote 4.52c.

Structural Material.—The situation is complicated by the urgent demand for steel bars for the smaller size shells, some of which are rolled on structural mills. The Pacific Coast Steel Co. will furnish its own material, which will be fabricated locally for a mill building requiring 250 tons at Portland, Ore. The St. Paul Foundry Co. was awarded 272 tons of structural steel work for the St. Paul Station, St. Paul, Minn. An unknown bidder will supply 127 tons of miscellaneous shapes to the Beaumont Shipbuilding & Drydock Co., Beaumont, Texas.

The official mill quotation is 3c., Pittsburgh, which takes

a freight rate of 27c. per 100 lb. for Chicago delivery. Jobbers quote 4.27c. for material out of warehouse.

Bars.—While the bar situation continues tight, it is not so bad as with plates and shapes. The Chicago Heights Mills of the Inland Steel Co., which was burned, will be under cover before extreme weather sets in. Meanwhile the mill is operating. The bar iron mills are steadily filling up, owing to the substitution of iron for steel. Some mills rolling rail carbon are running but 10 hours because of the scarcity of re-rolling rails and their operations may be still further reduced.

Mill prices are: Mild steel bars, 2.90c. Pittsburgh, taking a freight rate of 27c. per 100 lb.; discard bars, 2.25c. Chicago; bar iron, 3.50c. Chicago; rail carbon, 3c. Chicago.

Jobbers quote soft steel bars 4.17c., bar iron 4.17c., for $\frac{1}{4}$ in. thick and heavier. Reinforcing bars, 4.29 $\frac{1}{4}$ c. base. Under the new price there is no charge for twisting, but extras for sizes are quoted as per card. Shafting, list plus 13 per cent.

Sheets.—Except where sheets are in demand for Army stoves, airplanes and similar military uses, they do not rank to any great extent in the essential class and while their production is therefore necessary to some degree, it is subordinated to other manufactures. For mill prices see finished iron and steel f.o.b. Pittsburgh, page 865. Jobbers quote:

Chicago delivery out of stock regardless of quantity, No. 10 blue annealed, 5.52c.; No. 28 black, 6.52c., and No. 28 galvanized, 7.77c.

Rails and Track Supplies.—Standard section rails are among the products on which the mills which make them are concentrating at the direction of the Government. No new price has been announced for rails, but if a price were named, the mills would not be in a position to take on more business. It is reported that the Government is considering the transfer of rails from the Bethlehem Steel Co., to the Carnegie Steel Co., presumably because the latter's costs are lower.

Standard railroad spikes, 3.90c., Pittsburgh. Track bolts, with square nuts, 4.90c., Pittsburgh. Tie plates, steel, 3.25c.; tie plates, iron, 3.75c.; f.o.b. maker's mill. The base for light rails is 3c., f.o.b. maker's mill, for 25 to 45-lb. sections, lighter sections taking Government extras.

Old Material.—The demand is such that dealers can sell all the scrap they can get. All foundry and steel grades command the full allowable price plus the commission, while the rolling mills pay maximum prices, but for the most part are opposed to commissions except in the case of No. 1 railroad wrought and a few other items. The New York Central and the Pennsylvania Lines have issued lists.

We quote for delivery in buyers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Old iron rails	\$39.00
Relaying rails	\$55.00 to 60.00
Old carwheels	29.00
Old steel rails, rerolling	34.00
Old steel rails, less than 5 ft.	34.00
Heavy melting steel	29.00
Frogs, switches and guards, cut apart	29.00
Shoveling steel	29.00
Heavy steel axle turnings	24.00

Per Net Ton	
Iron angles and splice bars	\$34.82
Iron arch bars and transoms	41.52
Steel angle bars	30.36
Iron car axles	41.52
Steel car axles	41.52
No. 1 railroad wrought	30.36
No. 2 railroad wrought	29.46
Cut forge	29.46
Pipes and flues	25.89
No. 1 busheling	27.68
No. 2 busheling	20.00
Steel knuckles and couplers	30.36
Coil springs	30.36
No. 1 cast scrap	30.36
Boiler punchings	32.59
Locomotive tires, smooth	40.50 to 41.50
Machine-shop turnings	16.50 to 16.96
Cast borings	16.50 to 16.96
Stove plate and light cast scrap	25.50 to 25.89
Grate bars	25.50 to 25.89
Brake shoes	25.50
Railroad malleable	30.36
Agricultural malleable	29.00 to 30.00
Country mixed scrap	22.50 to 23.00

Wire Products.—An immense production of barbed wire is the principal concern of the mills. It crowds out other products and jobbers and others are not getting all they would like to have, but they cannot protest against supplying war needs. For prices see finished iron and steel f.o.b. Pittsburgh, page 865.

Cast Iron Pipe.—The 700-ton inquiry for the nitrate plant at Toledo is still pending. Another inquiry of the

same kind, also for a nitrate plant, comes from Ancor, Ohio, near Cincinnati, where 500 tons is required. The pipe makers have been granted an advance of \$5 per ton, but while this is in excess of the advance on pig iron, it is not altogether profit because of the higher costs in other directions.

We quote per net ton, f.o.b. Chicago, ex-war tax, as follows: Water pipe, 4-in., \$69.80; 6-in. and larger, \$66.80. Class A and gas pipe, \$1 extra.

Bolts and Nuts.—There is no change to report in a situation which finds the makers obliged to restrict the taking of orders to those whose work is of such an essential character that the raw material may be obtained. For mill prices see finished iron and steel f.o.b. Pittsburgh, page 865. Jobbers quote:

Structural rivets, 5.67c.; boiler rivets, 5.77c.; machine bolts up to $\frac{3}{8}$ x 4 in., 37½ per cent off; larger sizes 25 and 5 off; carriage bolts up to $\frac{3}{8}$ x 6 in., 32½ off; larger sizes, 20 off; box pressed nuts, square, tapped, 78c. off; hexagon tapped, 58c. off; coach or lag screws, gimlet points, square heads, 40 per cent off. Quantity extras for nuts are cancelled.

Philadelphia

PHILADELPHIA, Oct. 1.

New freight rates on shipments of semi-finished and finished steel products, pig iron, etc., will go into effect on Nov. 1 from Pittsburgh to New York, Philadelphia, Baltimore, Boston and other points in the East. These advances are the result of a decision handed down a few months ago by the Interstate Commerce Commission in the complaint of the Pollak Steel Co. vs. the Baltimore & Ohio Railroad, wherein it was contended that there was not the proper relationship between rates from Chicago, Cincinnati, Portsmouth and Ironton, Ohio, and Ashland, Ky., to New York, Philadelphia, Baltimore, Boston and other Eastern points. The Interstate Commerce Commission upheld the contention of the Pollak Steel Co. and ruled that the Chicago-New York rate should be 100/60ths of the Pittsburgh-New York rate; that the Cincinnati-New York rate should be 87/60ths of the Pittsburgh-New York rate; and that the Portsmouth, Ironton and Ashland rate should be 77/60ths of the Pittsburgh-New York rate. In making adjustments necessary to establish these relationships, the railroads have adopted the following new rates, effective Nov. 1: Pittsburgh to New York—Finished steel in carloads, 27c. per 100 lb., present rate 24.5c.; semi-finished steel, \$4.50 a gross ton, present rate, \$4; pig iron, \$4.30 a gross ton, present rate, \$3.90. Pittsburgh to Philadelphia—Finished steel in carloads, 25c. per 100 lb., present rate 23c.; semi-finished steel, \$4.10, present rate, \$3.80; pig iron, \$3.90, present rate \$3.60. Pittsburgh to Baltimore—Finished steel, 24c.; semi-finished steel, \$3.90; pig iron, \$3.70. Pittsburgh to Boston—Finished steel, 29.5c. per 100 lb.; semi-finished steel, \$4.90; pig iron, \$4.70. Another important change has been made, namely the abolition of split differentials and the substitution of full or class differentials. Thus, the present differential between New York and Philadelphia on finished steel is 1½c. per lb., whereas under the new rates the differential will be 2c. The above rates are those which will undoubtedly go into effect, but some confusion may be caused by the fact that blanket increases have been published and some of the advances shown in these statements are not those which will actually go into effect. For example, the new rate to Philadelphia from Pittsburgh on finished steel has been published as .245c., but in making adjustments the railroads will make this rate 25c., according to advice given to the steel trade here. Likewise, the published rate on billets, etc., is \$4, whereas \$4.10 will actually be the rate. On pig iron, the correct rate of \$3.90 has been published. These advances will help out eastern Pennsylvania steel makers and blast furnaces, particularly the latter which will derive 30c. a ton more now that pig iron in the Eastern zone is to be sold on a Pittsburgh basis.

Pig Iron.—Sellers of pig iron anticipate that there will be some confusion in changing the billing of iron from an f.o.b. furnace basis to a Pittsburgh basis. An interesting question relates to the rate which shall be

applied where two freight rates are in effect. For example, from Birmingham to Camden, N. J. and nearby points, there is an all-rail rate of \$6.80 and a water-competitive rate of \$5.30. On iron shipped from Virginia furnaces, it seems probable that consumers will insist upon the use of the \$5.30 rate, but whether furnaces will accede to this remains to be seen. To use the \$5.30 rate would mean a reduction of \$1.50 to the Virginia furnaces in the net amount paid to them. There is but one rate to Philadelphia from Birmingham, namely an all-rail rate of \$6.50, so no differences can arise on Philadelphia shipments. Except Bessemer iron, all grades are now based on the price for No. 2 foundry. This gives an increase to makers of low phosphorous, malleable, Bessemer ferrosilicon, silvery, and gray forge, the price of the latter being \$33, f.o.b. Pittsburgh, or \$1 below base, instead of \$32 as was erroneously stated last week. As noted in the preceding paragraph, the freight rate from Pittsburgh to Philadelphia on pig iron will be increased on Nov. 1 from \$3.60 to \$3.90, and thus eastern Pennsylvania furnaces will benefit to the extent of the added 30c. Surprisingly little business is being done in this market, but inquiries continue numerous, and evidence piles up of the growing shortage of foundry grades. So many furnaces have been diverted from foundry to basic iron and there have been such large allocations of foundry iron to those doing war work that many foundries are suffering for lack of iron. We now quote standard grades of iron at delivered prices Philadelphia or vicinity, except on low phosphorus iron, which continues to sell f.o.b. furnace regardless of location of maker.

Eastern Pennsylvania No. 1 X.....	\$40.60
Eastern Pennsylvania No. 2 X.....	38.85
Eastern Pennsylvania No. 2 foundry.....	37.60
Virginia No. 2 X.....	41.75
Virginia No. 2 foundry.....	40.50
Basic.....	36.60
Gray forge.....	36.60
Bessemer.....	38.80
Standard low phosphorus (f.o.b. furnace)....	54.00
Low phosphorus (copper bearings) (f.o.b. furnace).....	50.00

Ferroalloys.—There has been an improved demand for spiegeleisen but ferromanganese continues dull and weak. Prices are unchanged, \$250, delivered, for 70 per cent ferromanganese, with \$3.50 added or subtracted for units above or below that base, and \$75, f.o.b. furnace for 16 to 18 per cent spiegeleisen, with \$3.50 as the unit differential.

Iron Ore.—It developed at the pig iron conference in Washington last week that several Eastern consumers were running very short of Port Henry iron ore and steps were immediately taken to remedy this condition. The operators complained of insufficient labor. Notice was sent to local exemption boards in that district to give deferred draft classification to mine workers and a move was initiated to supply additional labor, which possibly will be taken from the stone and marble quarries of Vermont.

Billets, Etc.—Production of forging billets for shells was shown to be good at the conference on production held by makers and the War Industries Board last week in Washington. The Pittsburgh-Philadelphia freight rate on billets and other semi-finished steel will be increased on Nov. 1 from \$3.80 to \$4.10 a gross ton, making the delivered price in Philadelphia for 4 x 4-in. open-hearth re-rolling billets \$51.60 instead of \$51.30, the present Philadelphia price.

Finished Iron and Steel.—There is little new in the steel situation so far as mills in this district are affected. Production in September was at a good rate. The plate conference in Washington last week disclosed that plate production is at an especially high rate. The structural steel market is very dull. As noted in a preceding paragraph, the Pittsburgh-Philadelphia freight rate on finished steel will be advanced on Nov. 1 from 23c. per 100 lb. to 25c., thus giving an advantage to Eastern mills over those in the Pittsburgh district of 40c. a ton. The rate which has been published as adopted by the railroads is 24.50c., but it is understood that in the realignment of rates the rate finally adopted will be 25c. We quote plates at 3.48c.; structural material at 3.23c.; soft steel bars at 3.13c.; bar iron, 3.73c.;

No. 10 blue annealed sheets, 4.48c.; No. 28 black sheets, 5.23c.; No. 28 galvanized sheets, 6.48c., all Philadelphia.

Old Material.—Some in the trade have gotten the impression that the increase in differentials for high silicon foundry pig iron was granted by the general committee of the American Iron and Steel Institute to encourage the greater use of scrap in foundries, a mixture of about 50 per cent scrap with 50 per cent high silicon iron being mentioned as a suggestion that had gone forth to foundries. Others in the trade are inclined to doubt the correctness of this because of the great shortage of scrap, this shortage being as acute as that in foundry iron. In fact, from well-informed sources the prediction is advanced that within the next two or three months many foundries will be unable to operate for lack of scrap. Trading conditions remain about as they have been for several weeks. A fair business is being done, but dealers are handicapped by inability to procure material to meet demands. The embargo on shipments of borings and turnings to blast furnaces, which has expired by limitation, probably will not be renewed, as iron rolling mills have now received liberal shipments of clean borings and turnings through the permits by which they could pay up to \$21. We quote for delivery at buyers' works in eastern Pennsylvania:

No. 1 heavy melting steel	\$29.00
Steel rails, rerolling	34.00
No. 1 low phosphorus, heavy, 0.04 and under	39.00
Low phosphorus, 0.04 and under	36.50
Low phosphorus, 0.06 and under	\$32.00 to 34.00
Old iron rails	39.00
Old carwheels	29.00
No. 1 railroad wrought	34.00
No. 1 yard wrought	33.00
Country yard wrought	29.00
No. 1 forge fire	29.00
Bundled skeleton	29.00
No. 1 busheling	31.00
No. 2 busheling	19.00 to 20.00
Turnings (for blast furnace use)	19.00
Machine-shop turnings (for rolling mill use)	19.00
Cast borings (for blast furnace use)	19.00
Cast borings (clean)	19.00
No. 1 cast (for steel plant use)	29.00
No. 1 cast (cupola sizes)	34.00
Grate bars	28.00 to 29.00
Stove plate	28.00 to 29.00
Railroad malleable (for steel plants)	29.00
Railroad malleable (for malleable works)	34.00
Wrought iron and soft steel pipes and tubes (new specifications)	33.00
Ungraded pipe	29.00

Birmingham

BIRMINGHAM, ALA., Sept. 30.

Pig Iron.—Birmingham district operators are pleased with the new prices and rulings as to basing points, especially with reference to the stimulus imparted to the manufacture of high-grade metal with its resultant profits. Northern Alabama and Tennessee furnaces, by reason of freight differentials, will enjoy their old advantage as to price. There have been no additional basic allocations, but there is another inquiry under consideration. One interest is nearing the completion of an allocation of 10,000 tons of basic and will commence on another of 28,000 tons. Foundry allocations for the week approximated 10,000 tons. Gradually allocations enter more and more into calculations and regular orders for future delivery less. No more 1919 iron has been booked, the lead of one interest not having been followed. The new prices will stimulate production efforts. The Republic Iron & Steel Co. will blow in its third stack at Thomas during the week. The Alabama Co. has blown out one at Iron-ton and blown in another, the latter in prime shape for iron making. Stove makers held a conference during the week at Birmingham to consider the situation with reference to pig iron. They are in class C, but it has become apparent that there is little hope for pig iron for stoves for domestic purposes and they will go out for war work as much as possible. Meanwhile they are not in an enviable position. Brass bed manufacturers are in the same fix. Direct word has come from the War Industries Board that class C men need not hope for iron for non-essentials and suggestion has been made to Birmingham furnace operators that they even investigate demands

from class A. The line is being drawn tighter and tighter. Stove men have in their difficult situation found a greater use for low-grade iron and scrap than heretofore and out of this it is believed will develop a permanent ready market for metal for which makers have heretofore sought the market. Freight movements are easy and there is some indication of improved furnace practice as the colder weather approaches. We quote per gross ton f.o.b. Birmingham district furnaces as follows:

No. 2 foundry and soft	\$34.00
Basic	33.00

Cast Iron Pipe.—Under the new ruling pipe at Birmingham has advanced to \$60 per ton and there is little to be expected of municipalities, as heretofore. Government business continues to constitute the major portion of output.

Coal and Coke.—The coal output has steadily declined week by week for three weeks until it finally dropped to 382,000 tons compared with a July high of 433,000 tons. Lewisburg mines of the Alabama Co. have resumed after being flooded out and this ought to increase the output. Consumers of coke are still living from hand to mouth on account of the inadequate supply.

Old Material.—Stocks of old material are being depleted owing to the considerable amount used in place of pig iron and to added activity in southern consuming plants. Wrought has been especially active and approaches the maximum price. We quote per gross ton delivered in Birmingham district as follows:

Old steel axles	\$35.00 to \$40.00
Old steel rails	28.00 to 30.00
Heavy melting steel	27.00 to 27.50
No. 1 railroad wrought	30.00 to 33.00
No. 1 cast	29.00 to 31.00
Old carwheels	29.00 to 30.00
Tramcar wheels	28.00 to 29.00
Machine shop turnings	16.00 to 17.00
Cast-iron borings	17.00 to 18.00
Stove plate	25.00 to 26.00

Small consumers in the Birmingham district and adjacent territory are paying maximum Government prices for cast scrap, viz., \$29 in unbroken lots and as high as \$34.00 in cupola sizes of 150 lb. maximum delivered.

St. Louis

ST. LOUIS, Sept. 30.

Pig Iron.—The increase in the price of pig iron had no effect on the market at this point, as the metal is unobtainable except on priority orders, save for some small odd lots offered at various times, and increased cost is taken care of by being passed along to the ultimate user of the finished product utilizing the metal. Melters who are working on Government orders or on material ultimately destined for war uses are being accorded all the pig iron needed, but those engaged in other lines of operation are being held down to the lowest minimum and this is especially notable in the stove foundries, whose output at present is so restricted that they are threatened with extreme difficulty in holding their organizations together. One such foundry, has, in fact, taken to the policy of advertising in the daily press in large space seeking sub-contracts from holders of Government orders on which they may need help. Others are in similar condition and are taking similar steps to get business to keep their plants in operation.

Coke.—The coke conditions present no new features, as melters are covered by their sources of supply under an agreement to provide them with fuel on the basis of quantities of previous years with the condition that allotments so made which are not filled in any one month are not to be carried over into any succeeding month. By-product coke is fully sold up in this district and crushed sizes for domestic uses are very scarce also.

Finished Iron and Steel.—In finished products, conditions remain as at last reports with contract deliveries down to the minimum and strictly under Government regulation, while the warehouses are getting farther and farther behind in the receipt of supplies, a condition which is necessarily being passed on

to the consumer. For material out of warehouse, we quote as follows: Soft steel bars, 4.24c.; iron bars, 4.24c.; structural material, 4.34c.; tank plates, 4.59c.; No. 8 sheets, 5.54c.; No. 10 blue annealed sheets, \$5.59c.; No. 28 black sheets, cold rolled, one pass, 6.59c.; No. 28 galvanized sheets, black sheet gauge, 7.84c.

Old Material.—The scrap market has been stiffened somewhat by the advance in pig iron, if stiffening were possible in the present sharp demand for material and the lack of supply. The railroads are continuing to ship heavily of their material to the Pacific Coast and this is lessening the quantity available for the dealers and their customers. Consuming industries are buying freely and would buy more and contract ahead if the dealers were able to see any prospect of getting future material to deliver. The transactions made are practically all now on a Government price and commission basis and the aggregate of business is small because of the conditions already noted. So far as transactions go, the recent revision of freight rates in the St. Louis industrial district has had little effect because the consumers have been in such a position that they had to have whatever scrap was available regardless of the cost or freight rates. No lists have appeared, as is usual this late in the month, but dealers and consumers are hoping for new quantities to be made available during the coming week. We quote dealers' prices, f.o.b. customers' works St. Louis industrial district as follows.

Per Gross Ton	
Old iron rails	\$38.50 to \$39.00
Old steel rails, rerolling	33.50 to 34.00
Old steel rails, less than 3 ft.	31.00 to 31.50
Relaying rails, standard sections, subject to inspection	55.00 to 65.00
Old carwheels	28.50 to 29.00
No. 1 railroad heavy melting steel scrap	28.50 to 29.00
Heavy shoveling steel	28.00 to 28.50
Ordinary shoveling steel	27.00 to 27.50
Frogs, switches and guards, cut apart	28.50 to 29.00
Ordinary bundled sheet scrap	24.75 to 25.25
Heavy axle and tire turnings	21.50 to 22.00

Per Net Ton	
Iron angle bars	\$33.00 to \$33.50
Steel angle bars	29.50 to 30.00
Iron car axles	41.00 to 41.50
Steel car axles	41.00 to 41.50
Wrought arch bars and transoms	40.00 to 40.50
No. 1 railroad wrought	29.75 to 30.25
No. 2 railroad wrought	29.00 to 29.50
Railroad springs	29.75 to 30.25
Steel couplers and knuckles	29.75 to 30.25
Locomotive tires, 42 in. and over, smooth inside	38.50 to 39.00
No. 1 dealers' forge	26.00 to 26.50
Cast iron borings	16.50 to 17.00
No. 1 busheling	27.00 to 27.50
No. 1 boilers cut to sheets and rings	24.00 to 24.50
No. 1 cast scrap	29.50 to 30.25
Stove plate and light cast scrap	23.00 to 23.50
Railroad malleable	28.75 to 29.25
Agricultural malleable	26.75 to 27.50
Pipes and flues	25.25 to 25.75
Heavy railroad sheet and tank scrap	24.00 to 24.50
Railroad grate bars	21.50 to 22.00
Machine shop trimmings	16.50 to 17.00
Country mixed scrap	21.50 to 22.00
Uncut railroad mixed scrap	24.00 to 24.50
Horseshoes	29.00 to 29.50

San Francisco

SAN FRANCISCO, Sept. 24.

Work on the concrete shipyards on Government Island, Oakland, where concrete tankers are to be built for the Government, is nearing completion. On Sept. 28, coincident with the initial day of the drive for the Fourth Liberty Loan the work of making the form for the first vessel will start. When completed, the yards will have four ship ways, two on each side of the island. The plant, which was built by the San Francisco Shipbuilding Co., under direction of the United States Government, will cost approximately \$1,000,000. It is expected that the demand for reinforcing bars will tax the local market, which has been pretty well supplied with this material in the past. The other shipyards about the bay are nearing com-

pletion, with the exception of the Liberty at Alameda, which is making good progress, but is so vast that it will be several months before it will begin to construct ships. However, as an evidence of the progress being made in this enterprise, it is announced that the company has let a contract for 11,000 tons of structural shapes to the McClintic-Marshall Co. This is one of the largest single orders for structural steel ever let on the Coast.

The general labor situation seems to be somewhat easier at the present time, but it is evident that the strong efforts of the Government are needed to supply the men to man the construction work in the Liberty yard and other enterprises about to need more men. While the question of wages has not been officially settled, it is generally felt here that the Government efforts will result in their stabilization.

The jobbers are uneasy at the way the matter of the replacement of stocks is working out. They feel that, so far, it is inadequate but they hope as the system gets into better running order, their stocks will be maintained. There is an undercurrent of feeling, however, that with Government needs in excess of the supply, the jobbers are bound to suffer, notwithstanding the general recognition that delay in Government work must follow the elimination of the jobber or the cutting from his stock of any of the materials which he has been in the habit of carrying.

Bars.—The production of bars on the Coast continues at a normal rate, but if the demands of the concrete shipyards, about to come into the market on San Francisco bay and elsewhere on the Coast, are as great as anticipated a shortage may arise. So far the jobbers find their stocks of bars in better shape than those of almost any other iron or steel product.

Structural Materials.—No structurals are being used except for Government purposes, the awarding of the 11,000 ton contract to the McClintic-Marshall Co., by the Liberty Yards, Alameda, being the feature of the week. The jobbers report a fair stock of angles and shapes on hand.

Plates.—For some reason, the replacement of plates in the jobbers' stocks has been in better shape this month than in most materials. While it has not been complete the replacements have been sufficient to make the jobbers feel easy for another month.

Sheets.—The scarcity of sheets has not been relieved and jobbers are not hopeful that it will be so long as Government requirements for European construction continues at the present high level.

Wrought Pipe.—Representatives of large tubular goods mills say that the situation in wrought pipe continues unchanged. So far there has been enough for the more essential work in progress. Yet some of the enterprises rated as essential, but not standing among those with the highest rating, have had to wait long periods for delivery.

Cast-Iron Pipe.—No new municipal work has come into the market for several weeks and the representatives of the cast-iron pipe mills say that they are not looking for business of this nature to develop. Work on Government enterprises, however, is requiring a considerable quantity of iron pipe.

Pig Iron.—Pig iron continues to come in on old contracts, although the deliveries are behind their time schedule. There is none for sale on the open market.

Coke.—Some of the foundries have been trying to find other sources of supply than the Pennsylvania and Alabama fields, and experiments have been made with Northern coke and the Colorado product. Both of these are heavier in ash and sulphur content than the coke the foundries have been accustomed to use. However, it is stated that by mixing some of this Western coke with the Eastern supply, fair success has been met.

Old Materials.—Some of the foundries and mills have adopted the plan of putting the matter of scrap reads up to the office of the commission, thus shifting the responsibility of completing the Government work they are doing to that commission. So far, scrap has

been found in each case where it was imperatively needed, but none of the users is accumulating a reserve stock beyond immediate needs. We quote prices of scrap, gross ton basis:

Scrap steel for cupola use.....	\$34.00
First grade iron (machinery, railroad, agricultural)	34.00
Second grade (brake shoes).....	30.00
Third grade (clean broken stove plates).....	28.00
Fourth grade (grate bars, acid scrap free from burned iron)	20.00

Buffalo

BUFFALO, Sept. 30.

Pig Iron.—The views of furnacemen, so far as expressed, with reference to the price increase on foundry, basic and malleable grades, is, that it does not offset the increase in the cost of production to which they are now subject, which includes an advance in the price of ore and in labor costs. There is no thought of protest on the part of producers, however, as their attitude is that no obstacle shall be placed in the way of a prompt winning of the war and that they will aid in such manner as the Government decides is necessary in respect to price schedules. A cause for congratulation is the improvement in the quality of coke now being received, shipments of which are now coming in from the ovens in larger quantities, and it is hoped the coke supply can be kept up as so much depends upon this important factor in furnace output during the approaching winter months. Some additional sales of 1919 iron are reported as having been made during the week, with the proviso that Government allocation may force the abrogation of the 1919 sales contracts, or the postponement of deliveries on them until allocated orders shall be fully cared for. The new scale of differentials as promulgated by the American Iron and Steel Institute makes the price schedule as follows, f.o.b. furnace, Buffalo:

No. 1 foundry, 2.75 to 3.25 silicon	\$37.00
No. 2 X, 2.25 to 2.75 silicon	35.25
No. 3 foundry, 1.75 to 2.25 silicon	34.00
Gray forge	33.00
Malleable, silicon not over 2.25	34.50
Basic	33.00
Bessemer	35.20
Lake Superior charcoal, regular grades, f.o.b. Buffalo	37.50

Finished Iron and Steel.—There has been no easing up in the situation; but on the contrary a continued tightening of classification in respect to taking orders, and some mills are declining to entertain orders for priorities lower than A. This is especially true of flats, structural shapes, large rounds, 2½ in. and over and cold finished steel 2¼ in. and over. It is understood that one of the largest producers has been unable during the past week to accept orders from customers of very long standing, even when the order was accompanied by B.4 priority. In regard to shipments into Canada the War Industries Board ruling has been accepted by the War Trades Board at Ottawa, and all Canadian users of steel have been advised that where they could establish the essential character of their needs, these needs could be met by placing orders through Canadian mills to make application to the War Trades Board for priority assistance and this board will endorse such applications, as they consider essential and forward to the Canadian war mission, which in turn will present the application to the Priorities Division and the War Industries Board for final consideration.

Old Material.—Owing to the fact that the shortage of iron and steel scrap is becoming more acute daily, consumers are beginning to have serious doubts as to the possibility of securing adequate supplies for needs which are becoming increasingly pressing and consider the outlook for the coming months exceedingly dubious. It is stated that a good many consumers and dealers as well would welcome the establishment of a governmental regulation of shipments of scrap in the near future to insure and maintain an even distribution of such materials. Supplies of heavy melting steel are exceedingly short and although the aggregate of trading in this line has been large for the week as the demand is tremendous it was principally in small lots and it is

difficult to estimate its volume. Mills are getting steel in a hand to mouth fashion which is very unsatisfactory. We quote schedule prices as follows, per gross ton f.o.b. Buffalo:

Heavy melting steel	\$29.00
No. 1 low phosphorus, heavy, 0.04 and under	29.00
Low phosphorus, 0.04 and under	28.50
Low phosphorus, not guaranteed	24.00
No. 1 railroad wrought	34.00
No. 1 railroad and machinery cast	34.00
Iron axles	\$44.00 to 36.00
Steel axles	44.00 to 46.00
Carwheels	29.00
Railroad malleable	34.00
Machine shop turnings	17.00 to 17.50
Heavy axle turnings	24.00
Clean cast borings	18.00 to 19.00
Iron rails	36.00 to 37.00
Locomotive grate bars	27.50 to 28.00
Stove plate	27.50 to 28.00
Wrought pipe	27.00 to 28.00
No. 1 busheling scrap	29.00 to 30.00
No. 2 busheling scrap	21.00 to 23.00
Bundled sheet stamping scrap	21.00 to 23.00

New York

NEW YORK, Oct. 2.

Pig Iron.—Sellers in the New York district are readily adjusting themselves to new conditions arising from the establishing of Birmingham and Pittsburgh bases and the advancing of the base prices on No. 2 foundry pig iron and basic iron \$1 per ton. As all contracts written were based on maximum Government prices, it will be a matter of little difficulty to obtain the new prices, although, of course, some explanations must be made to buyers. The new prices represent sharp advances, especially on eastern Pennsylvania and Virginia irons, and the furnaces in those districts have obtained substantial relief from advanced costs. As charcoal and low-phosphorus pig iron are figured on the No. 2 foundry base, their prices are advanced \$1 per ton. The principal advances come from the new arrangement as to basing points. For example, on No. 1 X shipped from eastern Pennsylvania the price is \$37, Pittsburgh, and the freight from Pittsburgh to New York is \$3.90, making the new quotation \$40.90, an advance of \$5.50 over the price for delivery in New York up to Oct. 1. For No. 2 plain the new price is \$4 higher than the quotation up to Oct. 1. In the case of Alabama irons there is an advance of only \$1. We quote prices as follows for tidewater delivery for Northern and Southern grades up to Jan. 1, 1919:

No. 1 X, silicon, 2.75 to 3.25	\$40.90
No. 2 X, silicon, 2.25 to 2.75	39.15
No. 2 plain, silicon, 1.75 to 2.25	37.90
No. 2 X Virginia silicon, 2.25 to 2.75	42.95
No. 1 Southern (all rail)	43.20
No. 2 Southern (all rail)	41.70

Ferroalloys.—The spiegeleisen market is much more active than that for ferromanganese. In the past week there have been sales aggregating about 6000 tons of spiegeleisen, the quotation for which remains firm at \$75, furnace, for the 16 to 18 per cent grade and \$82, furnace, for the 18 to 20 per cent material. One sale consisted of 2500 tons of 30 to 40 per cent alloy and another of about 2500 tons of the 16 per cent grade, with about 1000 tons made up of smaller quantities. The delivery involved in most sales was distributed over this and next year. There is an inquiry in the market for 1000 tons for delivery in 1919. In ferromanganese only small inquiries or sales were noted. The quotation is \$250, delivered, for 70 per cent alloy with \$3.50 per unit added or subtracted above or below this standard. Some producers assert that this market is firm with spot and early delivery hard to secure, while others are of the opinion that an attractive offer would bring a concession from the regular quotation, particularly for this year's delivery. The market for 50 per cent ferrosilicon is quiet. Sales have been made at \$152.50 per ton on contract when 100 or more tons is involved. The quotation ranges from \$150 to \$155 on contract, with spot and early delivery quoted at about \$157.50 to \$165, delivered. There is an inquiry in the market for about 2000 tons of 25 per cent electric ferrosilicon for foreign delivery. Ferrotungsten is now quoted at about \$2.40 to \$2.50 per lb. of contained

tungsten, New York, with the ore concentrates selling at between \$20 to \$25.50 per unit in 60 per cent material. We quote ferrovanadium at \$4 to \$5, Pittsburgh, per lb. of contained vanadium for prompt delivery in small lots, but very little is available, large quantities going into steel on Government orders. Ferro-carbon-titanium, 15 to 18 per cent, is selling at \$200 per net ton in carload lots, at \$220 per ton in lots between one ton and a carload, and at \$250 per ton in lots less than a ton, f.o.b. Suspension Bridge, N. Y.

Finished Iron and Steel.—Although not generally known as yet, there will be, along with pig iron and semi-finished steel, an advance of about 10 per cent in freight rates to New England and the Atlantic Coast, effective Nov. 1. Apparently the commodity rates which have been ruling have been done away with and finished steel goes into a class carrying a 27c. per 100 lb. rate to New York from Pittsburgh and 31½c. to Boston. There is an inquiry in the market for 1100 tons of structural steel for the new plant of the American Cellulose Co., Cumberland, Md., for which the George A. Fuller Co. is general contractor. The Grand Trunk Railroad is getting figures on a coaling plant at Portland, Me., which will require 1200 tons. An extension to the plant of the DeLaval Steam Turbine Co., Trenton, N. J., will take 300 tons. Bids will be opened Monday in Washington by the Bureau of Yards and Docks, Navy Department, for the Government torpedo plant to be built at Alexandria, Va., involving 250 tons of structural steel and a considerable tonnage of reinforcing bars. No bids were received in Washington Monday for the marine railroad at San Diego, Cal., for which 400 tons of steel is required. A bridge to be built by the New York, New Haven & Hartford Railroad in Boston, taking 500 tons, has not been let at this writing. Warehouses are having difficulty in keeping up stocks of beams, angles, channels, etc., because of the large number of A priorities now being filled by the mills, and necessarily shipments on B-4 priority, the jobbers' rating, have been again and again deferred. We quote mill shipments as follows: Steel bars, 3.145c.; shapes, 3.245c.; plates, 3.495c., and bar iron, 3.745c., all New York. Out-of-store prices are 1c. higher.

Old Material.—Some borings and turnings are still being shipped to rolling mills working on Government business and these mills are paying \$21, delivered, while the delivered price for steel plants and blast furnaces is \$19. Sellers are now paying the Government tax of 3 per cent on the freight rate and our quotations have been revised accordingly. We quote buying prices of dealers and brokers, per gross ton, New York, as follows:

Heavy melting steel	\$26.12
Revolving rails	30.80
Relaying rails	\$60.00 to 70.00
Iron and steel car axles.....	43.40
No. 1 railroad wrought.....	30.90
No. 1 railroad wrought, cut to not less than 18 in. or over 24 in.....	35.90
Wrought-iron track scrap	28.80
Forge fire	25.00 to 26.00
No. 1 yard wrought, long.....	29.90
Light iron	10.00 to 11.00
Cold borings (clean).....	16.85
Machine-shop turnings.....	16.85
Mixed borings and turnings.....	16.85
Iron and steel pipe (1 in. minimum diameter), not under 2 ft. long.....	29.90
Stove plate	26.12
Locomotive grate bars	26.12
Malleable cast (railroad).....	31.12
Old carwheels	26.12

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, are:

No. 1 machinery cast	\$34.00
No. 1 heavy cast (columns, buildings, materials, etc.), cupola size.....	34.00
No. 1 heavy cast, not cupola size	29.00
No. 1 cast (radiators, cast boilers, etc.).....	29.00

Cast-Iron Pipe.—While cast-iron pipe manufacturers are glad to receive the advance of \$5 per ton, most of it will be absorbed in the higher cost of pig iron, amounting to about \$4 per ton. Cast-iron pipe manufacturers in other parts of the country, who are not compelled

to pay so much for pig iron, will fare much better than those in the Eastern territory. Government prices are \$67.70, New York, for 6-in. and heavier; \$70.70 for 4-in.; \$77.70 for 3-in., and \$1 additional for class A and gas pipe.

Cincinnati

CINCINNATI, Oct. 1—(By Wire).

Pig Iron.—The final effects of the price changes have not yet developed. Discouraging reports are received from the South as to the bad quality of coke now being supplied furnaces, and the labor question also is a very important one that is retarding the output of iron to a considerable extent. Few, if any, contracts for future shipment have been made lately, and buying for the last quarter has not been in evidence. Practically the only iron now changing hands is represented in a limited tonnage of high sulphur metal that can be obtained occasionally from some of the Southern furnaces. Several Tennessee furnaces are benefited to a moderate extent by the recent advance in prices on account of the freight differential in their favor on iron shipped to this territory. Some apprehension exists in southern Ohio about the proposed 8-hr. labor regulation, which, if enforced, will more than wipe out in production expense the recent advance allowed. The change giving an increase on iron having a high percentage of silicon is expected to have satisfactory results in the South at an early date. Shipments from all sections show that iron is moving more freely than at any time within the past 14 months. The allocation of iron with the exception of off grades is becoming much more stringent, and this is one reason why when the furnaces have any standard grades to sell they are slow in putting it on the market, as lately a number of contracts made were not filled because the iron was diverted to melters engaged in what was considered more urgent essential work.

Based on freight rates of \$3.60 from Birmingham and \$1.80 from Ironton, we quote, f.o.b. Cincinnati:

Southern coke, No. 2 foundry and No. 2 soft.....	\$37.60
Southern Ohio, No. 2.....	35.80
Basic, Northern	34.80

Coke.—Domestic coke inquiries are pouring in at a rapid rate. The supply is becoming scarcer and from present indications consumers of hard coal will hardly be able to get anything like the necessary quantity of coke to take its place. Shipments to blast furnaces and foundry consumers are moving at such a satisfactory rate that some of them have been able to lay in some coke that can be used during the coming winter, should an emergency arise. All coke users are making extraordinary efforts to circumvent any trouble such as was experienced last winter on account of the extreme weather. The labor question does not seem to be giving as much trouble, and reports from different districts show that it is steadier than for some time past. No particular field is making any complaint as to the scarcity of cars, although occasionally shipments are slowed down for the want of rolling stock, but the more frequent cause is the poor supply of labor.

Finished Material.—Jobbers are not meeting with much success in trying to augment their stocks. As fast as a car is received, it is almost immediately sent out to different customers, and very little of the material reaches the warehouse. This causes a saving in handling costs, but delayed shipments on orders placed several months ago invite pessimistic forebodings on the part of jobbers as to being able to take care of their customers' requirements. No business is accepted by any one unless positive proof is submitted that the material is for an essential industry. In some cases, this has necessarily created some confusion in filling small orders, but no deflections from the rule have been made. No definite information has been received as to any change in the discount on cold-rolled shafting, and the little business being transacted is on the old basis. Wire nails are very scarce and as fast as stocks are received they are forwarded to customers,

but lately Government work has taken practically all of the available supply of standard gages. Barbed wire cannot be had, as it is stated by the mills that the demand for war purposes exceeds their present capacities.

The following are local jobbers' prices: Steel bars and small structural shapes, 4.13c. base; large rounds and squares 2 in. and over, 4.23c. base; plates, 4.48c. base; No. 10 blue annealed sheets, 5.48c.; steel bands, 3/16 in. and lighter, 4.98c. base (using the new band list). Reinforcing concrete bars, 4.23c., and wire nails, \$4.50 per keg base.

Old Material.—The change to \$21 per gross ton, delivered, on borings and steel turnings for rolling mill use has not yet caused any advance in quotations here. The absence of any transactions on this basis is the reason. There is a very urgent demand for all kinds of foundry scrap, although some grades cost melters more than the usual differential between scrap and pig iron. The short supply is given as a reason for this scramble after some kinds of scrap, and as dealers' stocks are diminishing there is apt to be a much greater call for all kinds of old material. The following are buying market prices, f.o.b. cars Cincinnati and southern Ohio, in carload lots:

Per Gross Ton	
Bundled sheet scrap	\$21.50 to \$22.50
Old iron rails	33.50 to 34.00
Relaying rails, 50 lb. and up	44.50 to 45.00
Rerolling steel rails	31.00 to 32.00
Heavy melting steel scrap	27.50 to 28.00
Steel rails for melting	27.50 to 28.00
Old carwheels	27.50 to 28.00

Per Net Ton	
No. 1 railroad wrought	\$29.00 to \$29.50
Cast borings	13.00 to 13.50
Steel turnings	14.50 to 15.00
Railroad cast	25.00 to 25.50
No. 1 machinery	28.00 to 28.50
Burnt scrap	17.50 to 18.00
Iron axles	40.00 to 40.50
Locomotive tires (smooth inside)	35.50 to 36.00
Pipes and flues	21.00 to 21.50
Malleable cast	24.50 to 25.00
Railroad tank and sheet	19.00 to 19.50

Cleveland

CLEVELAND, Oct. 1.

Iron Ore.—Late shipments of iron ore from the Lake Superior district will be curtailed materially by a decision to so arrange the vessel schedules that over 100 large ore carriers will take on storage cargoes of grain at the head of the Lakes and tie up with these cargoes at Buffalo. Ordinarily the vessels would keep moving as long as possible, but as it is desired to bring this grain down to Buffalo by boat, thus avoiding winter transportation by rail, the vessels will take no chances on hauling ore until very late in the season with the intention of getting back to Duluth for a cargo of grain and being prevented from making this trip by sudden termination of the season of navigation. Because of this plan to handle the grain, a large number of boats will probably make one less trip than they would under ordinary circumstances, and it is estimated that the Lake movement for the season will be 2,000,000 tons less than it would otherwise be. The mobilization committee, which is handling the distribution of vessel and ore tonnage and which is making a survey of the demands of the furnaces, has secured reports from some of the ore consumers which indicate that were their shipping schedules kept up the remainder of the season, they would receive more ore than absolutely needed before the opening of navigation. While it is recognized that every ton of ore that is needed before spring must be brought down, the surplus above minimum requirements will be cut off and shipments of this ore postponed until spring. There is some demand for manganiferous ore in small lots from furnaces that wish to use some of this ore in their mixture because of high sulphur content of much of the coke. The manganese in the ore has an affinity for the sulphur and results in better furnace operation. We quote f.o.b. Cleveland, for shipment during the last quarter, as follows:

Old range Bessemer, \$6.65; old range non-Bessemer, \$5.90; Mesaba Bessemer, \$6.40; Mesaba non-Bessemer, \$5.75.

Pig Iron.—New Government demands for pig iron

continue heavy, between 50,000 and 100,000 tons having come up for distribution by the pig iron committee during the past two days. One additional allocation for the first half of 1919 delivery was made, this being 13,000 tons of low phosphorus iron. During the week, 53,000 tons of iron was allocated, making the total from May 1 to date 1,105,000 tons. The allocations included 21,000 tons of foundry iron, 14,000 tons of basic, 2400 tons of malleable and 16,000 tons of low phosphorus, the latter including the allocation for next year. With the placing of Tennessee and Virginia iron on a Birmingham basis, it is expected that furnaces in those districts will try to place their iron as far as possible in those territories giving them the best prices by reason of freight differentials. For example, the freight rate is \$5 from Birmingham to Cleveland, Buffalo, Pittsburgh and Detroit, and \$4.10 from Tennessee furnaces to the same shipping points, so that Tennessee furnaces get this differential of 90c. for shipments to the districts named as compared with a 40c. differential on iron shipped to the St. Louis and southern Indiana territories. The Cincinnati differential is approximately 80c. Some iron is still being sold in small lots for 1919 delivery, but inquiry is now light. We quote delivered Cleveland as follows:

Bessemer	\$36.60
Basic	33.40
Northern No. 2 foundry	34.40
Southern No. 2 foundry	35.00
Gray forge	32.40
Ohio silvery, 8 per cent silicon	49.90
Standard low phosphorus, Valley furnace	53.00

Old Material.—While the demand for scrap continues in excess of the supply, some dealers claim that mills are getting about all the material they need and as fast as they want it, and that the apparent shortage is due to the fact that with the Government price regulation the trade has no incentive to make future sales and mills cannot cover for their future requirements as has been customary with them. At a meeting of the Central Division of the American Board of Scrap Iron Dealers held in Cleveland Sept. 25, a resolution was adopted asking C. A. Barnes, Philadelphia, secretary of the board, to give widespread publicity hereafter to all special scrap iron and steel rulings. This action was taken because of some criticism of the recent order permitting eastern Pennsylvania iron rolling mills to pay \$21 for borings and turnings. Dealers stated that almost every class of consumer is willing to pay more than the Government maximum and they voiced objections to the special order in favor of rolling mills. The more important scrap yards in this district have been certified to Mr. Barnes as being essential and it is expected that there will be no difficulty in obtaining priority listing of them. The demand is active for most grades of scrap, particularly for heavy melting steel borings and turnings. Consumers are taking about all the cast scrap available and stove plate is scarce. The New York Central lines West will close Oct. 5 on a scrap list involving considerable tonnage. We quote delivered consumers' yards in Cleveland and vicinity as follows:

Per Gross Ton	
Steel rails	\$28.00 to \$29.00
Steel rails, under 3 ft.	34.00
Steel rails, rerolling	34.00
Iron rails	39.00
Iron car axles	46.50
Steel car axles	46.50
Heavy melting steel	29.00
Cast borings	19.00
Iron and steel turnings and drillings	19.00
Hydraulic compressed sheet scrap	28.00 to 29.00
No. 1 railroad wrought	34.00
Cast-iron carwheels, unbroken	29.00
Cast-iron carwheels, broken	34.00
Agricultural malleable	29.00 to 30.00
Railroad malleable	34.00
Steel axle turnings	24.00
Light bundled sheet scrap	24.50 to 25.00
Cast-iron scrap	29.00
Cast-iron scrap, broken to cupola size	34.00
No. 1 busheling	30.00 to 31.00

Per Net Ton	
Railroad grate bars	\$24.00 to \$25.00
Stove plate	24.00 to 25.00

Coke.—Some of the Cleveland foundries that are

using Ashland, Ky., by-product coke have been notified that shipments will be suspended and this coke diverted to less distant delivery points. Virginia coke is still being shipped in the Cleveland territory under contracts made for a year that do not expire until next January, but no contracts covering only the last half were taken for shipment of this coke in the Cleveland territory. The market is inactive. Shipments on contracts are fairly good.

Finished Iron and Steel.—Mills are getting considerable additional tonnage in small lots of steel, nearly all of which is allocated by the Government. Conferences were held in Washington last week by both the plate and sheet manufacturers. Efforts are being made by the Government to increase plate production and it is stated that it is probable that the sheet output will be further curtailed so that some of the semi-finished steel now absorbed by sheet mills will be diverted to the plate mills. Little new plate business is being placed with the Cleveland mills, as they are filled up for months ahead. Ohio shops doing ship-fabricating work are getting material much better than they have been, owing to the fact that shipments of the different materials are being scheduled to meet their needs. That the mill deliveries do not generally show an improvement, however, is indicated by the fact that one large Ohio cold-drawn steel manufacturing plant is running at only one-half capacity because of inability to secure steel bars, although having class A priority orders for its products. The steel requirements for motor trucks are heavier than anticipated. Mills are getting large orders for spring steel for trucks and there is an inquiry for steel tubing for 40,000 rear axle trucks. Representatives of iron-rolling mills held a conference with a Government representative in Washington Sept. 26 to endeavor to secure a modification of the Government specifications for bar iron used in railroad-car work. The rolling mill men say that the puddle bar requirements for iron are too severe and they do not have sufficient puddled bar capacity to meet the requirements. A modification of the specifications would permit the use of more scrap. The matter was taken under advisement. The demand for hard steel for reinforcing purposes is very light and one Ohio mill is now running entirely on shell discard, its product going largely to the implement trade. Warehouses are finding it almost impossible to get soft steel bars for stock and jobbers' stocks in other lines are very low.

Steel bars, 4.07c.; plates, 4.42c.; structural material, 4.17c.; No. 10 blue annealed sheets, 5.42c.; No. 28 black sheets, 6.42c.; No. 28 galvanized sheets, 7.67c.

OBITUARY

W. B. HARPER, assistant purchasing agent, Sharon Steel Hoop Co., Youngstown, Ohio, dropped dead near the hospital of the Sharon, Pa., works Sept. 30. He was 60 years of age. The coroner attributed the death to heart failure.

GEORGE W. WILSON, aged 50 years, for six years manager of the coal department of J. H. Hillman & Co., Pittsburgh, died Sept. 30.

ALBERT P. WEIGEL, president and general manager, Weigel Machine Tool Co., Peru, Ind., died Monday, Sept. 16.

The Manufacturers' Council of the State of New Jersey, through its president, Warren C. King, has called a meeting of the members for the annual fall convention on Oct. 9, at the Robert Treat Hotel, Newark. At this gathering it is proposed to make changes in the constitution and by-laws of the Council, to provide for the affiliation of local organizations of manufacturers in the different industrial communities, as well as for the creation of local manufacturers' associations where there are none at present. It is held that these changes will stimulate the interest of local manufacturers in current industrial problems, and tend towards an increased membership in the State Council.

IRON AND INDUSTRIAL STOCKS

Allied Successes Bring Increased Buying, Notwithstanding Pressure of Fourth Liberty Loan

NEW YORK, Oct. 1.

The complete engrossment of the nation in the Fourth Liberty Loan financing has not prevented the stock market, the past week, from expanding substantially in volume under the powerful impulse of favorable military operations. A tone of pronounced strength was displayed late in the week. A steady demand has developed among representative shares for investment. American Steel Foundries was very active, the turnover being 32,500 shares at a net advance of 9½ points and the closing quotation 90%. A record of 91½ was set for these shares on Thursday, making an advance of nearly 25 points since July 1.

The range of prices in active iron and industrial stocks from Tuesday of last week to Wednesday of this week was as follows:

Allis-Chalm. com.	29½ - 31½	Int. Har. Corp.	
Allis-Chalmers pf.	82½ - 84½	com.	66 - 68½
Am. Can com.	44½ - 46	Int. Har. Corp.	
Am. Can pf.	92 - 92½	pf.	104½
Am. Car & Fdry.		Lackaw. Steel	80 - 83
com.	85½ - 88½	Lake Supr. Corp.	17½ - 18½
Am. Car & Fdry.		Midvale Steel	49½ - 53
pf.	110½ - 111½	Nat.-Acme	30½ - 31
Am. Loco. com.	65½ - 67½	Nat. Enam. & Stn.	
Am. Loco. pf.	98½ - 98¾	com.	49½ - 51½
Am. Ship com.	135 - 139	N. Y. Air Brake	121 - 124½
Am. Ship pf.	85½ - 91½	Nova Scotia Steel	65
Am. Steel Fdries.	85 - 92	Pressed Steel com.	70½ - 72½
Bald. Loco. com.	89 - 92½	Ry. Steel Spring	
Bald. Loco. pf.	99½	com.	67½ - 71½
Beth. Steel com.	79½ - 81½	pf.	101½
Beth. Stl. Cl. B.	77½ - 82½	Republic com.	90½ - 93
Carbon Stl. com.	118 - 120	Republic pf.	100
Chic. Pneu. Tool.	69½	Sloss com.	60 - 62
Colo. Fuel	46½ - 48	Superior Steel	41½ - 42
Cruc. Steel com.	62 - 67	Supr. Stl. 1st pf.	98 - 100
Crucible Steel pf.	89½	Un. Alloy Steel	37 - 38
Gen. Electric	146 - 149	U. S. Pipe com.	41 - 43½
Gt. No. Ore Cert.	31½ - 32½	U. S. Steel com.	109½ - 113½
Gulf States Steel	76½ - 80	U. S. Steel pf.	110½ - 110¾
Int. Har. of N. J.		Va. I. C. & Coke	72 - 72½
com.	126½ - 134½	Warwick	8½
Int. Har. of N. J.		Westingh. Elec.	43½ - 44
pf.	106		

Pittsburgh and Nearby Districts

No. 1 blast furnace of the Shenango Furnace Co., Sharpsville, Pa., has been in continuous blast since Aug. 17, 1914. For the four years ending Aug. 17, 1918, this furnace made an average of 507 tons of Bessemer iron per day, or a total of 740,220 tons for the four years named, which is certainly a remarkable record. The furnace is still in fair condition.

The Standard Turnbuckle Co., Corry, Pa., maker of aeronautical accessories, is building an addition to its plant, 60 x 200 ft., to be used exclusively for the manufacture of turnbuckles for aeroplanes.

A project is on foot to change the name of Sharon, Pa., to Buhl City, in honor of Frank H. Buhl, former steel manufacturer, who lived in Sharon for many years and did much for the betterment of the town in every way. The proposed change will be voted on at the coming November election.

The A. M. Byers Co. has relinquished its lease on the Columbia mill of the Susquehanna Iron Co., Columbia, Lancaster County, Pa., and local interests are endeavoring to organize a new company to resume operations.

The Carnegie Steel Co. has started operation on the seventh unit of 64 ovens at its Clairton by-product coke plant, making a total of 448 ovens in operation. It is expected the entire plant of 640 ovens will be in operation by Nov. 1.

The Witherow Steel Co., with a plant on Neville Island, has purchased a plant site and buildings near Jeannette, Pa., looking forward to the time when the Government ordnance plant will force removal from its present location.

Metal Markets

	Copper, New York				Lead		Spelter		
	Lake	Electro-lytic	Tin, New York		New York	St. Louis	New York	St. Louis	
Sept.									
25....	26.00	26.00	81.00*		8.05	7.75	9.65	9.30	
26....	26.00	26.00	81.50*		8.05	7.75	9.60	9.25	
27....	26.00	26.00	82.00*		8.05	7.75	9.55	9.20	
28....	26.00	26.00	....		8.05	7.75	9.50	9.15	
30....	26.00	26.00	82.00*		8.05	7.75	9.50	9.15	
Oct.									
1....	26.00	26.00	82.00*		8.05	7.75	9.40	9.05	

*Nominal.

NEW YORK, Oct. 2.

All the markets are inactive and devoid of interest. Copper output has improved and the general situation seems better. There is no business in tin and there have been no developments in the international situation. Lead is as scarce as ever. Spelter is very inactive and still declining. Antimony is firm.

New York

Copper.—General conditions remain unchanged with the maximum price for copper at 26c. per lb. ruling until Nov. 1, for carload and larger lots, with the jobbing price at 27.35c. per lb. It is confidently expected that by Oct. 15 the question of new prices effective after Nov. 1 will be decided. Many look for an advance. Copper output for August will probably show an increase over that for July and also for August last year. A published compilation of the production of 20 companies puts the August output at 151,790,490 lb. as compared with 151,359,302 lb. in July. For the eight months ended Aug. 31, this year, the total is put at 1,230,042,896 lb. as against 1,184,605,846 lb. for the same eight months in 1917. It is stated that casting copper and jobbing lots of refined copper are selling under the maximum fixed prices, indicating that ordinary domestic requirements have dwindled decidedly.

Tin.—Business has practically come to a stop. There have been sales of some nearby metal of all grades available, but the amount has been small. In the markets for future delivery, where really big transactions are usually made, nothing has been done. Tin for November shipment from the Straits could probably be bought at 71.25c. per lb. The spot market has stiffened and is now nominal at 82c., New York, but very little is obtainable. As to the international situation and the control of the world market, there have been no further developments and importers are as much in the dark as ever as to their future. Tin arrivals at Atlantic ports to Sept. 30 have been 1025 tons, with those at Pacific ports 3620 tons to Sept. 25. The London market is again lower at £337 10s. per ton for spot Straits, against £340 10s. a week ago.

Lead.—No improvement in supplies is recorded nor is there any change in the general situation. What lead is available is being strictly controlled as to price and distribution by the Lead Producers' Committee, which is handling a difficult situation quite satisfactorily. By agreement, prices are fixed at a maximum of 7.75c., St. Louis, or 8.05c., New York, for carload and larger lots, with quantities less than this at 8.55c., New York. Both imports and exports of lead for the seven months ended July 31, 1918, show a considerable increase over the same period last year.

Spelter.—Demand continues very light and quotations have gradually fallen until yesterday prime Western was nominal at 9.05c., St. Louis, or 9.40c., New York, for October delivery, with spot delivery at 9.15c., St. Louis, or 9.50c., New York. For November-December the market is fairly firm at 8.95c., St. Louis, or 9.30c., New York. Buyers show no interest and large sellers do not seem anxious. Rumors have it that considerable foreign inquiry is in sight. Grade A spelter has a fixed maximum price of 12c. per lb., base. The Government's weekly report of output and stocks of

all grades shows an increase for the week of about 600 tons in production and a decrease of about 700 tons in stocks.

Antimony.—The market for wholesale lots is slightly higher at 14c. per lb., duty paid, New York, for spot and early delivery. There have been fairly heavy arrivals recently, but demand is better.

Aluminum.—No. 1 virgin metal, 98 to 99 per cent pure, and scrap are held at maximum Government prices. For 50-ton lots these are 33c. per lb.; for 15 to 50-ton lots, 33.10c. per lb., and for 1 to 15-ton lots, 33.20c. per lb.

Old Metals.—The market is quiet. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible.....	26.00
Copper, heavy and wire.....	25.00
Copper, light and bottoms.....	23.00
Brass, heavy.....	17.75
Brass, light.....	13.25
Heavy machine composition.....	25.50
No. 1 yellow rod brass turnings.....	15.00 to 15.25
No. 1 red brass or composition turnings.....	23.50
Lead, heavy.....	8.00
Lead, tea.....	6.50
Zinc.....	7.00

Chicago

OCT. 1.—The metal market presents little interest. Copper demand is easily taken care of at established prices. Tin is in light demand with plenty to fill the need. The price has fluctuated but now stands at the level of a week ago. Lead is eagerly sought and is difficult to procure. Spelter is quiet but a trifle higher. Antimony is quiet. We quote copper at 26c. for carloads and 27.30c. for part carloads; tin, 85c. to 90c.; lead, nominal at 7.85c. in carloads, 8.35c. per lb. for 1 to 25 tons and 8.60c. per lb. for less than 1 ton; spelter, 9.75c.; antimony, 15.50c. to 16c. On old metals we quote copper wire, crucible shapes, 22.50c.; copper clips, 21.75c.; copper bottoms, 21.50c.; red brass, 22.50c.; yellow brass, 15.50c.; lead pipe, 6.50c.; zinc, 5.75c.; pewter, No. 1, 45c.; tinfoil, 50c.; and block tin, 60c.

St. Louis

SEPT. 30.—The nonferrous markets have been quiet but firm the past week with carload lots as follows: Lead, 7.75c.; spelter, 9.15c. to 9.40c.; less than carloads: Lead, 8.25c. for 10 tons or more and 8.50c. for smaller quantities; spelter, 10c.; tin, none offering; copper, 27.50c.; antimony, 18c. In the Joplin district zinc ore has been slightly stronger and the greater part of the second grade ores brought \$55 per ton, an advance of \$2.50. Some poorer ore sold below that price while the usual amount of high grade ore brought \$75 per ton. The basis of 60 per cent controlled as usual. Producers are becoming dissatisfied with the price of ore as compared with metal and are trying to bring the smelter buyers into line with their way of thinking. Labor is scarcer and deferred classification is to be asked by a number of mines to keep the output up. Calamine was steady at \$34 to \$40 per ton, basis 40 per cent. Lead was strong at \$100 per ton, basis 80 per cent. The averages for the week for the metals were: Lead, \$100 per ton; calamine, \$38; zinc blende, \$53. We quote for scrap metals, dealers' buying prices as follows: Light brass, 10c.; heavy yellow brass, 15c.; heavy red brass and light copper, 20c.; heavy copper and copper wire, 22c.; pewter, 50c.; tinfoil, 65c.; lead, 6c.; zinc, 5c.; tea lead, 5c.

A recent issue of a Russian paper states that it has been decided by the authorities to turn the two syndicates, the Prodamera and the Krovlya, into a government department for the control of the iron and steel industry in Russia. All companies with blast-furnace plants will in the future be obliged to sell their pig iron through the new government department, and even non-syndicated works will have to sell all their iron and steel through the same official channel.

The Skinner & Eddy Corporation, Seattle, Wash., on Sept. 21 presented each of its 13,000 employees a \$1,000 insurance policy, on which premiums will be paid by the company, entailing no expense to the recipient.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

An advance in freight rates of 25 per cent from Pittsburgh on finished iron and steel products, including wrought iron and steel pipe, went into effect June 25, 1918. The rates from Pittsburgh, in carloads, to points named, per 100 lb. are as follows: New York, 24.5c.; Philadelphia, 23c.; Boston, 27c.; Buffalo, 17c.; Cleveland, 17c.; Cincinnati, 23c.; Indianapolis, 25c.; Chicago, 27c.; St. Louis, 34c.; Kansas City, 59c.; St. Paul, 49½c.; Denver, 99c.; Omaha, 59c.; minimum carload, 36,000 lb. to four last named points; New Orleans, 38.5c.; Birmingham, 57.5c.; Pacific Coast, \$1.25; minimum carload, 80,000 lb. To the Pacific Coast the rate on steel bars and structural steel is \$1.315, minimum carload 40,000 lb.; and \$1.25, minimum carload 50,000 lb. On wrought iron and steel pipe the rate from Pittsburgh to Kansas City is 50c. per 100 lb., minimum carload 46,000 lb.; to Omaha, 50c., minimum carload 46,000 lb.; to St. Paul and Minneapolis, 49.5c., minimum carload 46,000 lb.; Denver, 99c., minimum carload 46,000 lb. A 3 per cent transportation tax applies. On iron and steel items not noted above, rates vary somewhat and are given in detail in the regular railroad tariffs.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in. angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, structural sizes, 3c.

Wire Products

Wire nails, \$3.50 base per keg; galvanized, 1 in. and longer, including large-head barb roofing nails taking an advance over this price of \$2, and shorter than 1 in., \$2.50. Bright basic wire, \$3.35 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$3.25; galvanized wire, \$3.95; galvanized barb wire and fence staples, \$4.35; painted barbed wire, \$3.65; polished fence staples, \$3.65; cement-coated nails, \$3.40 base; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 47 per cent off list for carload lots, 46 per cent for 1000-rod lots, and 45 per cent off for small lots, f.o.b. Pittsburgh.

Bolts, Nuts and Rivets

Large structural and ship rivets, \$4.40 base
Large boiler rivets, \$4.50 base
7/16 in. x 6 in. smaller and shorter rivets, .50-10 per cent off list
Machine bolts h.p. nuts, ¾ in. x 4 in.:
Smaller and shorter, rolled threads, .50-10-5 per cent off list
Cut threads, .50-5 per cent off list
Larger and longer sizes, .40-10 per cent off list
Machine bolts, c.p.e. and t. nuts, ¾ in. x 4 in.:
Smaller and shorter, .40-10 per cent off list
Larger and longer, .35-5 per cent off list
Carriage bolts, ¾ x 6 in.:
Smaller and shorter, rolled threads, .50-5 per cent off list
Cut threads, .40-10-5 per cent off list
Larger and longer sizes, .40 per cent off list
Lag bolts, .50-10 per cent off list
Flow bolts, Nos. 1, 2, 3, .50 per cent off list
Hot pressed nuts, sq., blank, .250c. per lb. off list
Hot pressed nuts, hex., blank, .230c. per lb. off list
Hot pressed nuts, sq., tapped, .230c. per lb. off list
Hot pressed nuts, hex., tapped, .210c. per lb. off list
C.p.e. and t. sq. and hex. nuts, blank, .225c. per lb. off list
C.p.e. and t. sq. and hex. nuts, tapped, .200c. per lb. off list
Semi-finished hex. nuts:
¾ in. and larger, .60-10-10 per cent off list
¾ in. and smaller, .70-5 per cent off list
Screw bolts, .70-10 per cent off list
Screw bolts, .2½ per cent extra for bulk
Tie bolts, .50-10-5 per cent off list

The above discounts are from present lists now in effect. All prices carry standard extras.

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, \$57; chain rods, \$65; screw, rivet and bolt rods and other rods of that character, \$65. Prices on high carbon rods are irregular. They range from \$70 to \$80, depending on carloads.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16 in. x 4½ in. and heavier, per 100 lb., \$2.90, in lots of 200 kegs of 200 lb. each, or more; track bolts, \$1.90. Boat spikes, \$5.25 per 100 lb., f.o.b. Pittsburgh.

Terne Plate

Effective May 21 prices on all sizes of terne plates are as follows: 8-lb. coating, 200 lb., \$15 per package; 8-lb. coating, 1 C., \$13.30; 12-lb. coating, 1 C., \$17.00; 15-lb. coating, 1 C., \$18.00; 20-lb. coating, 1 C., \$19.60; 25-lb. coating, 1 C., \$20.00; 30-lb. coating, 1 C., \$21.75; 35-lb. coating, 1 C., \$22.75; 40-lb. coating, 1 C., \$24.00 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars at 2.90c. from mill. Refined iron bars, 3.50c. in carload and larger lots, f.o.b. mill.

Wrought Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card, as announced Nov. 5 by the Government on steel pipe, those on iron pipe being the same as quoted for some time:

Butt Weld			
Steel		Iron	
Inches	Black Galv.	Inches	Black Galv.
1½, ¾ and ¾	44 17½	1½ and ¾	23 +4
1½	48 33½	¾	24 +3
¾ to ¾	51 37½	¾ to 1½	28 10
		¾ to 1½	33 17
Lap Weld			
2	44 31½	1½	18 3
2½ to 6	47 34½	1½	25 11
7 to 12	44 30½	2	26 12
13 and 14	34½	2½ to 6	28 15
15	32	7 to 12	25 12
Butt Weld, extra strong, plain ends			
1½, ¾ and ¾	40 22½	1½, ¾ and ¾	22 5
1½	45 32½	¾	27 14
¾ to 1½	49 36½	¾ to 1½	33 18
2 to 3	50 37½		
Lap Weld, extra strong, plain ends			
2	42 30½	1½	19 4
2½ to 4	45 33½	1½	25 11
4½ to 6	44 32½	2	27 14
7 to 8	40 26½	2½ to 4	29 17
9 to 12	35 21½	4½ to 6	28 16
		7 to 8	20 8
		9 to 12	15 3

To the large jobbing trade an additional 5 per cent is allowed over the above discounts, which are subject to the usual variations in weight of 5 per cent. Prices for less than carloads are four (4) points lower basing (higher price) than the above discounts on black and 5½ points on galvanized.

On butt and lap weld sizes of black iron pipe, discounts for less than carload lots to jobbers are seven (7) points lower (higher price) than carload lots, and on butt and lap weld galvanized iron pipe are nine (9) points lower (higher price).

Boiler Tubes

The following are the prices for carload lots, f.o.b. Pittsburgh, announced Nov. 13, as agreed upon by manufacturers and the Government:

Lap Welded Steel		Charcoal Iron	
3½ to 4½ in.	34	3½ to 4½ in.	12½
2½ to 3½ in.	24	3 to 3½ in.	+ 5
2½ in.	17½	2½ to 2¾ in.	+ 7½
1¾ to 2 in.	13	2 to 2½ in.	+ 2½
		1¾ to 1¾ in.	+ 3½
Standard Commercial Seamless—Cold Drawn or Hot Rolled			
Per Net Ton		Per Net Ton	
1 in.	\$34.00	1¾ in.	\$220
1½ in.	280	2 to 2½ in.	190
1¾ in.	270	2½ to 3¾ in.	180
1½ in.	220	4 in.	200
		4½ to 5 in.	220

These prices do not apply to special specifications for locomotive tubes nor to special specifications for tubes for the Navy Department, which will be subject to special negotiation.

Sheets

Makers' price for mill shipments on sheets of United States standard gage in carload and larger lots, are as follows:

Blue Annealed—Bessemer		Cents per lb.	
No. 8 and heavier			4.20
Nos. 9 and 10			4.25
Nos. 11 and 12			4.30
Nos. 13 and 14			4.35
Nos. 15 and 16			4.45
Box Annealed, One Pass Cold Rolled—Bessemer			
Nos. 17 to 21			4.80
Nos. 22 and 24			4.85
Nos. 25 and 26			4.90
No. 27			4.95
No. 28			5.00
No. 29			5.10
No. 30			5.20
Galvanized Black Sheet Gage—Bessemer			
Nos. 10 and 11			5.25
Nos. 12 and 14			5.35
Nos. 15 and 16			5.50
Nos. 17 to 21			5.65
Nos. 22 and 24			5.80
Nos. 25 and 26			5.95
No. 27			6.10
No. 28			6.25
No. 29			6.50
No. 30			6.75
Tin-Mill Black Plate—Bessemer			
Nos. 15 and 16			4.80
Nos. 17 to 21			4.85
Nos. 22 to 24			4.90
Nos. 25 and 27			4.95
No. 28			5.00
No. 29			5.05
No. 30			5.05
Nos. 30½ and 31			5.10

Steel Centers Respond to Liberty's Call

(Continued from page 840)

only a \$50 bond. With largely increased earnings, it is felt that the workers should be more liberal subscribers and a quota has been prepared for them. Persons earning up to \$5 a day are being asked to subscribe for an amount equal to one day's earnings for 26 weeks and those averaging higher wages are asked to make higher subscriptions, depending on their circumstances. The West Steel Castings Co. was the first company in the metal working field to be awarded the 100 per cent

honor emblem, having on Saturday sold to its employees the total quota of bonds allotted them.

A plan has been adopted under which workmen who move from one plant to another will be held to their obligation to pay up their bond subscriptions. The subscription form now used in factories has a clause in which the employee authorizes his employer to transfer to his new employer, should he change his place of employment, his subscription agreement and payments already made, and to sell to the new employer the bond held against the subscription.

A feature of the campaign is an exhibit of war material made in Cleveland. This is located in a temporary building on the Public Square.

Chicago Starts with Noise and Enthusiasm

CHICAGO, Sept. 30.—The Liberty loan campaign started at nine o'clock September 28 with the blowing of whistles at shops and factories throughout Chicago and suburbs, automobiles and trucks adding to the din in the city's streets. The machinery was in good working order, and enthusiasm was whetted by the presence in the city of Secretary of the Navy Josephus Daniels. In an address Friday night, Mr. Daniels dwelt largely on the great work done at the Great Lakes Naval Training Station.

Bonds will be sold in Chicago by 36,000 persons, their work being done through two main organizations, the trade committees and ward and district committees. In the trades organization the general plan of previous campaigns was followed. The iron and steel committee again has for its chairman, S. J. Llewellyn, president Interstate Iron & Steel Co., whose committee did splendid work in the third drive. The quota of the committee is \$17,000,000, or nearly double what it placed in the last campaign. While the actual work of selling bonds began last Saturday, the committee has been active for weeks in fostering plant meetings, flag raisings, etc., to stimulate interest. Assisting Mr. Llewellyn are the following vice-chairmen:

Rolling mills.—G. H. Jones, Inland Steel Co.

Blast furnaces.—R. S. Dutton, Pickands, Brown & Co.

Warehouse steel.—Charles Heggie, Scully Steel Co.

Steel works.—C. F. Biggert, Wisconsin Steel Co.

Brass, etc.—Samuel Deutsch, Ohio Iron & Metal Co.

Fabricated steel.—Fred A. Ingalls, 332 South Michigan Avenue.

Miscellaneous iron and steel.—J. T. Llewellyn, 129th Street and Racine Avenue.

Tools, etc.—J. L. Hench, Lackawanna Steel Co.

United States Steel Corporation.—W. J. Totten, Illinois Steel Co.

Of the last-named division E. F. Axner, Illinois Steel Co., is a captain.

The first subscription actually received by the iron and steel committee came from the Lunkenheimer Co., Cincinnati, before the drive opened. The company announced that it had allotted \$10,000 to the Chicago district. It greatly cheered the committee, for an earnest effort is being made to induce companies located outside of Chicago, but maintaining branch offices here wherein a large business is transacted, to give Chicago its share of their purchases of the bonds. The United States Steel Corporation is a notable example of fairness in this respect.

E. P. Welles, president Charles Besley & Co., again heads the Machinery Committee, Charles H. Munch of the firm being a captain. Mr. Welles and his associates have before them the big task of selling bonds amounting to \$6,800,000, as against \$3,000,000 in the third loan. He is tackling the job with characteristic energy. He has two big assets, the Western Electric Co. and the International Harvester Co., but these are offset by the fact that his field embraces only 150 firms in the machinery and allied lines and a number of branch offices. He is getting after the "foreign" firms vigorously in the effort to have them allot a portion of their investments to Chicago, maintaining that the allotment should be commensurate with the percentage of business obtained here. On Sept. 23 Mr. Welles entertained 24 captains of his committee at luncheon in the Machinery Club of Chicago, which again is the headquarters of the machinery section. Mr. Welles is proud of his committee as it consists of the owners and sales managers of the leading firms of the machinery district.

For the time being, street soliciting has been dispensed with and selling is confined to business houses and homes.

The Liberty bond purchases of the Inland Steel Co., Chicago, and its employees in all departments will amount to about \$1,800,000.

Detroit Determined to Exceed Quota

DETROIT, Sept. 30.—Finding in all places co-operation and offers of assistance far exceeding those of any previous patriotic drive, Liberty Loan leaders expect this city to retain its unblemished reputation as the first major city "over the top," in spite of the fact that its quota has been doubled over the last campaign. Declaring that the war has at last been brought home, and that the American casualty lists and the victorious advance of the United States troops have aroused the people at home to a high pitch of patriotism, the local executive committee expects a response far greater than ever before.

Detroit's quota has been set at \$73,387,980. To raise this sum the largest and most efficiently organized body of salesmen in the history of the city's patriotic drives has been formed to sell bonds, upward of 300,000 individuals. On the regular sales teams will be nearly 3000 business men devoting practically their entire time during the drive to sales efforts. This force will be augmented by the school children of the city and a large force of women workers.

The city has been divided into ten geographic divisions, each in charge of a major commanding from 10 to 50 captains. The captains in turn are in charge

of ten-men teams. In each division auxiliary women and boy scouts teams have been assigned.

Factory canvassing will be in charge of a separate organization represented in each geographic division. This work is in charge of Allan A. Templeton, president of the Detroit Seamless Steel Tubes Co., and war industries board advisor for Michigan, and Horace Peabody of Peabody's Co. Every factory in Detroit will be thoroughly canvassed by sales teams. Plants will be closed during the actual canvassing and employers are co-operating in every possible way to insure the purchase of bonds by their employees. In most cases firms will underwrite the subscriptions of their men, taking out a sufficient amount from their wages each week to cover the bond payments.

The Ford Motor Co. will conduct a whirlwind campaign, reaching its 40,000 employees in 24 hours. It will proceed on the assumption that every employee desires to buy a bond and those unable to do so will appear before a committee and be given exemption only on sufficient reason.

Similar plans have been worked out for the other large industrial plants, insuring a substantial increase in purchases on the part of the workmen of Detroit.

Subscriptions from concerns themselves will be increased from 50 to 300 per cent. One concern has already reported that it will take \$900,000 in bonds this time where it had only \$300,000 of the last issue. Yet another concern which hid behind its employees' subscriptions in the last campaign will purchase \$200,000 worth of bonds this time.

Spectacular features for factory canvassing have been planned. Speakers, including many returned soldiers, also boy scout bands and military organizations, will be used in arousing enthusiasm in the various plants.

Detroit, the greatest munition producing center in the United States, is expected to furnish a barometer of national conditions on this loan. Money is plentiful, wages are high and employment plenty. The selling point that money invested in bonds will be paid out in wages in Detroit will be used with telling effect, it is believed. Detroit at a conservative estimate is working on \$900,000,000 in war orders, and less than one-tenth of this is asked in Liberty Loan subscriptions.

Among the iron and steel men actually engaged in the campaign is Muir B. Snow, manager of the Detroit Twist Drill Co., who is supervisor of the entire women's organization. Captains of teams include E. Y. Howell, Solway Process Co.; F. E. Cline, American Bridge Co.; Wm. C. Clark, Page Steel & Wire Co.; J. O. Merckling, Maxwell Motor Co.; B. J. Craig, Ford Motor Co.; Robert F. Hill, Michigan Bolt & Nut Works; F. B. Cooper, Michigan Bolt & Nut Works; L. K. Douglass, American Brass & Iron Co.; A. W. Fussey, Peninsular Brass Works, and C. C. Boone, Detroit Can Co.

Washington Is Confident

WASHINGTON, Oct. 1.—The Nation's fourth Liberty loan campaign began last Saturday with a rush that promised an overwhelming success. The officials at Washington in charge of the campaign proclaimed their confidence that there would be no difficulty in putting the nation over the top well ahead of the \$6,000,000,000 mark that has been set. Next to the question of the dollar total is the number of subscribers. Here it is hoped that the people will pass 22,000,000—5,000,000 more than subscribed to the third loan.

It is pointed out that the number of subscribers is one of the most important features of the loan's success, for it will demonstrate as nothing else can the unanimity of the nation's support of the Government's war program. An army of 22,000,000 subscribers would be a most formidable weapon.

Every department of the Government, with every wheel in its machinery, is helping to force the Liberty loan to success. The President himself made the most important address of the campaign at the opening meeting in New York. His address, as he himself put it, was not made to urge loan subscriptions. But there can be no doubt about its efficacy in stirring up interest in the loan because of the great step which it marked toward peace in the clarification of war aims.

Every city in the country is also apparently devoting 100 per cent of its energy to a record-breaking loan campaign. As early as Saturday morning the reports of over-subscriptions began to pour into the Treasury Department. From all over the country came announcements that communities had totaled larger subscriptions than their quotas called for and asking authority to fly the honor flags of the Fourth loan. Each succeeding day helped to pile up a greater total of subscriptions.

New York started with \$200,000,000 for its first day's list, double its first day's figures for the Third loan. Philadelphia was put down at \$33,000,000; Boston at \$50,000,000, and Baltimore at \$30,000,000. None of these figures, however, were official, and it was expected that the official returns would go even higher than these.

Among the individual subscriptions of the first day, the United States Steel Corporation stood at the head with \$40,000,000. This was from the company itself. At least \$30,000,000 is expected, at Washington, from the employees of this corporation. It would take but little more than \$100 each from these well paid work-

ers to total another \$30,000,000. That figure, however, ought to be exceeded by the workers of the Emergency Fleet Corporation from whom an average \$100 purchase would make a total of almost \$40,000,000.

The first day's subscriptions in the Navy Department ran up to \$2,000,000, of which \$875,000 alone came from the Philadelphia navy yard and almost \$500,000 from the Washington navy yard. Workers on the battleship Delaware alone subscribed \$102,000.

The Machinery, Machine Tools and Railway Supplies Committee at New York reported that it had collected subscriptions totaling about \$3,000,000 among them being the following:

American Car & Foundry Co., \$1,000,000; Niles-Bement-Pond Co., \$500,000; Railway Steel Spring Co., \$500,000; E. W. Bliss Co., \$500,000; American Machine & Foundry Co., \$200,000; Henry Prentiss & Co., \$150,000; Rufus L. Patterson, \$50,000; Fairbanks, Morse & Co., \$20,000; Armspear Mfg. Co., \$20,000.

Much interest was aroused by the promise of a Liberty Loan honor flag for industrial concerns and it is expected by Treasury officials that the iron and steel industry will distinguish itself particularly in this line.

Liberty Loan Campaign at Cincinnati

CINCINNATI, Sept. 30.—Late returns at Liberty loan headquarters indicate that more than \$3,000,000 was subscribed in Hamilton county, in which Cincinnati is located, on the first day's drive. Few of the large manufacturing plants in the outlying districts had been heard from, and many in the city proper did not send in reports on account of the half holiday.

Reports from all employers of labor that have been received indicate that the workmen are much more enthusiastic over the fourth loan than during the campaign for the third, and for this reason it is believed that the number of small subscriptions will be far in excess of the record for the last loan.

The same general plan was employed as was adopted for the last campaign; the city being divided into districts under different teams. All of the machine tool makers and other manufacturers have arranged for the purchase of bonds on easy terms, and in most plants an expert devotes all his time in explaining the nature of the investment and upon what terms a bond may be purchased.

Homestead Steel Record

At the Homestead Steel Works of the Carnegie Steel Co., Homestead, Pa., are employed about 12,000 men and 500 women. The quota of the fourth Liberty loan for this plant was \$2,000,000, but in a little over 24 hours the subscription to the loan at the plant amounted to \$2,150,000, and subscriptions are still being made, so that the total may reach \$2,500,000 or more. The quota was based on the August payroll, which was about \$2,000,000, and the understanding was that each employee should subscribe one month's pay, and this was done in record breaking time. As soon as the quota was reached and passed, the whistles at the Homestead Steel Works started to blow, and kept it up for fully half an hour.

Pittsburgh's Lively Start

PITTSBURGH, Oct. 1.—The drive on the fourth Liberty loan campaign in the Pittsburgh district went off with a bang, and several of the large industrial plants reported over the top and their quota subscribed and ready for their 100 per cent banner before evening of the first day of the drive, and the Homestead Steel Works awakened the town at 12.30 A. M. Friday, when every whistle within reach let go to announce that every man in the plant had subscribed two days ahead of the stated opening.

Other plants which reached 100 per cent on the first day were A. M. Byers & Co., South Side plant, American Locomotive Co.; Pittsburgh Transformer Co.; Mesta Machine Co.; Neely Nut & Bolt Co.; Monongahela Tube Co.; Phillips Mine & Mill Supply Co.; Duquesne Steel Foundry.

The big campaign opened Saturday evening at Syria Mosque, when Secretary of the Navy Daniels made a ringing speech, in which he told what was expected of the workers of Pittsburgh, not alone in subscriptions, but in supplying materials which were essential to the successful carrying on of the war.

The climax of the meeting came when Chairman McEldowney announced the subscription of \$1,500,000 by Henry C. Frick as recognition that he still considered himself a Pittsburgher.

St. Louis Opens with Vim

ST. LOUIS, Sept. 30.—The fourth Liberty loan campaign was opened at St. Louis last Saturday with a vim that excelled even the spirit of the previous campaigns and gave every promise that St. Louis would over-subscribe her quota of \$77,710,000 long before the close of the campaign.

As was the case with the previous loans, the iron, steel and allied industries in and about St. Louis played no small part in the preliminaries intended to insure the success of the campaign and in the actual solicitation and purchase of bonds. For several weeks preceding the formal opening of the campaign inspirational meetings were held at most of the iron, steel and metal-working plants, during which the entire force of a plant, after hearing a good war talk or two, would with uplifted or clenched hand pledge their heart, soul and might to the Government. Though the matter of buying Liberty bonds was not brought up at many of these meetings, the fact that several of the plants reported a 100 per cent subscription among the workers before the close of the first day of the campaign is convincing evidence of the good effects of the meetings.

Notable among such meetings were those held at the American Steel Foundries in Granite City, Ill., where 2000 workmen in unmistakable tones voiced their patriotism, at the Scullin Steel Co., St. Louis, and the St. Louis Car Co. The management of these and other iron plants meanwhile showed their patriotism in another way. Thousands upon thousands of dollars were spent by the St. Louis industries throughout the last month in newspaper advertisements of the Liberty loan. Some of the companies paid for full-page advertisements in a number of newspapers over a long period. Among them were the Commonwealth Steel Co., Beck & Corbit Iron Co., Fairbanks, Morse & Co., McQuay-Norris Mfg. Co. and Mississippi Valley Iron Co.

In the matter of subscriptions the Heine Safety Boiler Co. announced a 100 per cent subscription among its employees at noon on the first day of the drive. The employees of the Wagner Electric Co. subscribed for \$60,000 worth of bonds the first day, two of the departments receiving the 100 per cent flag. In East St. Louis \$2,000,000 worth was subscribed for the first day, the numerous iron and steel mills in the vicinity taking the better portion of that amount.

Molybdenum Mines Taken Over

Norwegian capitalists have taken over, at a price of 2,500,000 crowns, the famous molybdenum mines, the "Knaben mines" in Fjotland, according to a report from Commercial Agent Norman L. Anderson at Copenhagen. Since 1905 these mines had belonged to the Blackwell Developing Co., Ltd., an English corporation. The plant comprises "Knaben mines" 1 and 2. No. 1 has been worked off and on ever since 1885 and has produced more molybdenum than any other single mine in the world. "Knaben mine number 2" is, however, the main one. The plant is in full working order and an ore zone of considerable dimensions has been discovered. The head office of the new company will be in Christiania.

Chas. F. Banning Arrested

Charles F. Banning of Banning, Cooper & Co., iron and steel brokers, Pittsburgh, has been arrested by Federal authorities as an alien enemy and charged with furthering German propaganda work in the United States.

The Corrosion of Coke-Oven Walls

H. Schwenke of Herringen, Germany, has a contribution in a recent issue of *Glückauf* on the corrosion of coke-oven walls, due, in the author's practice, principally to the presence of excessive quantities of common or rock salt in the coal used. The translated abstract is from the *London Iron and Coal Trades Review*. It has been recommended that the composition of the water used for washing the coal for coke ovens should be so regulated that the common salt content should not exceed 1 gram per liter (0.1 per cent), a condition difficult to attain at some cokeries, as, for instance, those in the northeastern parts of Rhenish-Westphalia, as the local coals and also the partings contain a considerable amount of salt, and the percentage of this in the water running off the washed coal cannot be kept down lower than about 5 grams per liter (0.5 per cent). The problem was, therefore, to find a refractory material which will resist the corroding action of excessive quantities of common salt and to fix upon a design of coke oven in which the heat could be controlled, so that local overheating may be avoided.

The type selected was a Koppers regenerative oven, and for the lining highly acid and well-burnt bricks of about 85 per cent of SiO_2 with a close texture were used. The results were highly satisfactory, as it was found possible to keep the oldest battery of ovens at work for 5 yr. without any repairs, until their working was temporarily stopped by the war. In the case of this battery the corrosion had reached a depth of 3 to 4 cm. (1.18 to 1.57 in.), and had attained its maximum in the lowest rows close to the gas burners, where the heat was the most intense. The attack of the chlorides, therefore, was most effectual.

The author publishes some photographs of the interiors of coke ovens, showing the effect of corrosion. One of these represents the interior of an oven in which in the course of its five years' service 12,400 tons of coal had been coked, and consequently, according to the author's estimate, over 8 tons of salt had been volatilized. He explains that the incrustations to be found near the door have not been caused by salt, but are due to local overheating by the burning of coke already finished, as toward the end of the coking period the clay joint loses its efficiency, and is no longer able to exclude the outer air from the oven. These excrescences can be easily removed with a chisel, and the original surface of the lining exposed, whereas in the case of incrustations produced by salt these drop off and leave deep scars.

Other photographs are given of ovens which have been in service for 3 yr. and 5 mon., 2 yr. and 6 mon. and 2 yr., respectively. In all these four ovens the brick lining was built up with fireclay joints. Two more photographs show the interior of a fifth oven, in which the lowest 12 rows of silica bricks, with SiO_2 content exceeding 90 per cent, were laid experimentally with lime joints. On comparing these two photographs with that of the interior of an oven which had been in service for the same period (two years), and in which the same quantity of coal (5,000 tons) had been coked, but which was lined throughout with the 85 per cent SiO_2 bricks with fireclay joints, the difference in the appearance is pronounced. In spite of the excess of salt in the coal charged into it, there was no sign of corrosion in the lowest rows, and the difference in the surfaces of the top portion lined with 85 per cent bricks and the bottom portion is also noticeable. While the 90 per cent bricks laid in lime show a smooth surface, the surface of the 85 per cent bricks with fireclay joints is rough and full of cracks. The author suggests that when using the better material the division walls could perhaps be made thinner and better heat transfer could be obtained thereby.

According to a statement made by Mayor Biquier of Port Arthur, Ont., it is the intention of Sir William Mackenzie and others to double the capacity of the Atikokan blast furnaces at Port Arthur. Plans are under way for the reopening of the works, and it is expected that operations will be started at an early date.

DISH-CAST STEEL INGOTS

Use of Tun Dishes in Pouring Electric Steel Into Ingot Molds

The method of pouring steel by the use of tun dishes, particularly in Great Britain, was discussed before the Iron and Steel Institute in 1916 by J. N. Kilby and abstracted in *THE IRON AGE* Oct. 12, 1916. Further facts and discussions of this subject appeared in *THE IRON AGE* Dec. 7, 1916, and July 5, 1917. The advantage claimed for this process of pouring consists essentially in the cooling down of a hot heat before it enters the ingot mold as well as an insurance against slag admixtures. The application of this device to electric steel is discussed. By using tun dishes of various forms two or three molds can be filled at the same time from one ladle—another advantage in top pouring.

John A. Holden, in a recent issue of the *London Iron and Coal Trades Review*, goes into this subject in an article, "Dish-Cast Ingots," and gives some recent developments and results particularly with reference to electrically melted chrome-nickel steels. His article follows:

The production of steel ingots which will work up into bars and billets free from defects is by no means an easy undertaking. The process of manufacture may have some bearing on the quality of the steel, but defects such as pipe and cracks are common to all processes. Steel made in the electric furnace is no exception to this statement. As the available temperature is extremely high, it is perhaps not surprising that electrically-melted steel does not always reach the anticipated standard of excellence. Unfortunately, no method of determining the temperature of liquid steel has been evolved which is reliable and capable of withstanding the conditions of furnace application.

Temperature in Casting

The temperature of casting no doubt deserves some of the criticism it receives. Where the operations are controlled by the furnaceman hot casts are more prone to be made than cold heats. As the men are often paid in proportion to the weight cast, they are chiefly concerned with teeming all the steel from the ladle. The simplest way of filling an ingot mold is to teem direct from the ladle, commonly known as top-running. With certain steels the ingots may be free from cracks; with others the results speedily convince one that simplicity is its only commendable feature. High-carbon steel may be cast in the manner indicated and teemed hot enough to give a pitted surface, yet there would be a very small risk of cracked ingots. On the other hand, the percentage of pipe would reach serious dimensions.

Molds which are filled with the wide end uppermost, and fed through a fire-clay nozzle or feeder head, yield the least amount of scrap through piping. The author made two casts of steel of almost identical composition, using 12-cwt. molds of similar pattern for both heats. The first cast was dish-cast with the narrow end uppermost. One of the ingots was broken, and it was found that the secondary pipe terminated 2 ft. from the ingot top, equivalent to 44 per cent of the length of the ingot. The second cast was teemed into molds with the wide end uppermost. One ingot was sawn horizontally across at a distance of 4 in. from the top. In this case the pipe terminated at 7 in. from the ingot top.

As bottom-run ingots are usually cast in groups, each mold is necessarily filled very slowly, and it is well known that such ingots are much less liable to crack than similar steels top-run direct from the ladle. Further, ingots of the former class usually have a clean surface, which is smooth except for ripple marks.

Mr. Kilby states that bottom-cast ingots are prone to contain fluxed runner brick.* The writer can confirm this statement. An analysis of a slag globule taken from the runner immediately under the ingot

agreed in the silica percentage (the quantity obtained was very small, and not sufficient to make a complete analysis) with the silica content of the runner bricks. The steel in question was basic electric, and very low in carbon, 0.09 per cent.

Effect of Dish Teeming

The effect of dish-teeming is to fill the molds very slowly, because the dish reduces the size and the velocity of the stream. There is no doubt that temperature determines the viscosity of steel; the writer, however, has not made any comparative tests on these lines. In passing through the dish the steel cools considerably; so much so that an inexperienced eye can see the difference. But dish-teeming gives a splashed surface, and as appearances have some commercial value, this operates against it. The writer has found that the effect of the splashes are almost negligible. This applies with equal force to alloy steels.

Below is given a series of casts showing the results obtained with various steels and methods of casting. The dish-casting was suggested by Mr. J. M. Kilby's paper. The casts of steel were all electrically melted.

Nickel-Chromium Steels (Nos. 1, 2 and 3)

No. 1.—Top Run.

Size of Nozzle in the Ladle	Pit	Results
¾ in. . . Six 12-cwt. size molds.		First two ingots cracked horizontally; remainder free from cracks. Surface fairly good; sixth ingot lapped. Speed of teeming—1st ingot, 90 secs.; 6th ingot, 120 secs.; skull in the ladle, 1½ cwt.

No. 2.—Bottom Run.

1¼ in. . . Six 12-cwt. molds set radially round the trumpet.	Ingots free from cracks; surface lapped near the top; otherwise good. Speed of teeming, 4 min.
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No. 3.—Dish-Teemed.

1¼ in. . . Six 12-cwt. molds. Three 2-way dishes 1-in. nozzles throughout.	Ingots free from cracks, surface splashed. Average of 2¼ min. for teeming each. Yielded very satisfactory billets.
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No. 4.—0.10 per cent Carbon Steel.

1¼ in. . . Six 12-cwt. molds. Three 2-way dishes; first two ¾ in. nozzles; Remainder 1-in.	Ingots free from cracks; surface splashed. Billets required very little chipping.
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No. 5.—1.00 per cent Carbon Steel.

1¼ in. . . Six 12-cwt. molds. Three 2-way dishes; 1-in. nozzles throughout.	Surface splashed. Ingots yielded 89 per cent of the weight as billets.
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The same pattern molds were used throughout. Cheek bricks were used to form a feeder head. The cracked ingots obtained in No. 1 cast were free from fash, and the stream did not wipe the mold. The results obtained were confirmed in a subsequent cast.

The use of metal lath, stuccoed, for house construction is advocated and explained in a volume entitled "As a Man Liveth," published by the Associated Metal Lath Manufacturers, 901 Swetland Building, Cleveland. The text emphasizes the value of providing for workmen attractive homes having an element of individuality that promotes dignity, responsibility, personal pride and love of home, factors making for greater working capacity and minimum labor turnover. Examples of both good and bad housing are shown, and the difference is brought out by contrast. Permanent construction is urged and stucco on metal lath is recommended for economy of construction, maintenance, efficiency in house heating, availability, adaptability, beauty, permanence and fireproofness. Many views, plans and details are given of single homes and of modern industrial communities built of this material. The variety of types of metal lath manufactured by members of the association are shown in detail. Stucco specifications are outlined and illustrated. Tests of stucco on metal lath made by the U. S. Bureau of Standards are also summarized. A nominal price of \$1 has been placed on the book.

*"Steel Ingot Defects," by J. N. Kilby. *Journal of the Iron and Steel Institute*, 1916 and 1917.

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These cranes are for a new boiler shop at Richmond, Va., and are in addition to an order taken by the same company several weeks ago. The Northern Engineering Works has sold four 10-ton cranes to the American International Shipbuilding Corporation, Hog Island, Philadelphia. The Barber Asphalt Paving Co., Philadelphia, is inquiring for a 5-ton grab-bucket crane, 42 ft. span. The William Cramp & Sons Ship & Engine Building Co., Philadelphia, requires a 20-ton and a 40-ton crane of 80 ft. span. The Liberty Steel Products Co., New York, is inquiring for a 20-ton crane, 50 ft. span.

The Bureau of Yards and Docks, Navy Department, Washington, has awarded a contract to the Norman Kerr Co., New York, for new magazine buildings at Bay Shore, Long Island, to cost \$11,500. It has also let contract to Neimann & Luth, 33 West Forty-second Street, New York, for an addition to building No. 6, Brooklyn Navy Yard, to cost \$35,700.

The Ordnance Department will build a one-story boiler plant at Baldwin, Long Island. The Austin Co., 217 Broadway, New York, has the contract. Plans are being prepared by the Ordnance Department for a base reclamation plant to be located on Governor's Island. Gen. R. C. Marshall, Jr., is in charge.

The Asbestos Fabric Co., New York, has been incorporated with a capital of \$10,000 by R. L. Haas, B. A. Ellis and F. J. Rose, 117 West Nineteenth Street.

The General Chemical Co., 25 Broad Street New York, is considering the construction of a three-story plant, 200 x 600 ft., on Race Street, Baltimore, Md., to cost \$200,000. Westinghouse Church-Kerr & Co., Inc., 37 Wall Street, is the engineer.

The Richmond Light & Railroad Co., New Brighton, S. I., has received permission from the Shipping Board to make improvements in its plant and system to cost about \$600,000. The work will include the enlarging of its electric generating plant, etc.

The United Wood Pattern Works has leased property at 546 West Twenty-second Street, New York, for a pattern shop.

The Terry & Tench Co., Grand Central Terminal Building, New York, has incorporated the Terry & Brittain Development Corporation, with capital of \$25,000. It is understood the new organization will be used for the proposed shipbuilding operations of the company. E. F. Terry, F. Tench and A. P. Tessier are the incorporators.

George Stuart, Granite Springs, N. Y., has filed plans for alterations in his machine shop at 312-16 East Twenty-eighth Street, New York, to cost about \$10,000.

The Vulcan Rail & Construction Co., 35 Meserole Street, Brooklyn, is planning the erection of a two-story addition, 90 x 115 ft., at Meserole and Banker streets.

The Philadelphia Quartz Co., 121 South Third Street, Philadelphia, has acquired about 30 acres on the Pennsylvania Railroad near Rahway, N. J., as a site for a new plant. The works, including housing development for employees, will cost, it is reported, about \$1,000,000.

Fire, Sept. 26, at the plant of the Bayway Chemical Co., Bayway, South Elizabeth, N. J., caused a loss of about \$25,000, including machinery and equipment.

The Sprague Electric Works of the General Electric Co., Watsessing, Bloomfield, N. J., has filed plans for an addition to cost about \$22,000.

The Empire Steel & Iron Co., Mt. Hope, N. J., will install a new electric turbine with auxiliary equipment at its power plant.

A one-story boiler plant, 25 x 90 ft., to cost \$10,000 will be erected by the William F. Taubel Co., Riverside, N. J., at its hosiery manufacturing plant.

The International Saw Co., Newark, N. J., has filed notice of organization to operate a works at 625 North Third Street. Ernest B. Slade, 240 Parker Street, and Anton Felin, 74 Shephard Avenue, head the company.

G. L. Spence, Inc., Irvington, Newark, N. J., has been incorporated with a capital of \$50,000 by G. L. and E. S. Spence, and J. J. Fullerton, Irvington, to manufacture machinery.

The United States Shipping Board has ordered the installation of coal-burning equipment in addition to the oil-firing apparatus on the vessel "Agawam," recently launched at the yards of the Submarine Boat Corporation, Port Newark, Newark, N. J. The installation will include new grates, stokers, coal and ash-handling machinery, and coal storage facilities. It is understood that the other vessels of this type being built at the yards will be similarly equipped. William H. Farnsworth is superintendent of the ship-fitting department, which department is now giving employment to about 2500 men.

The New York Blower Co., 370 Central Avenue, East

Orange, N. J., has filed notice of organization by Emil A. Briner, 559 Central Avenue, to manufacture blowers, etc.

Fire, Sept. 28, caused by an explosion destroyed a portion of the shell-loading plant of the Oliver Loading Co., Runyon, N. J., with loss reported at \$150,000, including machinery and buildings used for the "booster" department. The plant will be rebuilt at once. The works have been devoted to the loading of 75-mm. high-explosive shells. The company is operated by the T. A. Gillespie Co., 50 Church Street, New York.

H. W. Cotton, Inc., Thirty-fourth and Thirty-fifth streets, Brooklyn, N. Y., manufacturer of machinery, is having plans prepared for a six-story, reinforced-concrete building, 200 x 600 ft., at Thirty-eighth and Thirty-ninth streets and Thirteenth Avenue, as an extension to its works.

The Steel Hoop & Heavy Hardware Co., New York, has been incorporated with a capital of \$100,000 by J. J. Silver, J. W. Leonard and A. C. Kahn, 51 Chambers Street.

The Berger Mfr. Co., 154 Eleventh Avenue, New York, manufacturer of metal products, has arranged for alterations in the five-story factory at 516-24 West Twenty-fifth Street, 50 x 100 ft., to cost about \$7,000, to be occupied under lease.

The Schaefer Mfg. Co., 31 West 125th Street, New York, manufacturer of acetylene specialties, has been merged with the Oxy-Acetylene Equipment Co., located at the same address.

The Sperry Gyroscope Co., 40 Flatbush Avenue Extension, Brooklyn, will make extensions in its eleven-story building at Flatbush Avenue and Concord Street, to cost \$5,000.

The Dawn Boat & Shipbuilding Corporation, New York, has been incorporated with a capital of \$25,000 by E. Hehre, J. W. Becherer and G. Auer, 812 Forest Avenue.

The Straight Line Regulator Corporation, New York, has been incorporated with a capital of \$50,000 by W. Ashbury, J. Rawle and W. A. Daly, 261 Broadway, to manufacture machinery, motors, etc.

The Brooklyn Heights Railroad Co., 85 Clinton Street, Brooklyn, will build a one-story addition to its repair shop on Wyckoff Avenue near Palmetto Street.

The Brude Lifeboat Co., New York, has been incorporated with a capital of \$50,000 by O. Johannessen, H. Gunderud and K. Furubotn, 3089 Broadway, to manufacture lifeboats.

The Spear Fire Equipment Works, Brooklyn, has been incorporated with a capital of \$10,000 by W. Metkiff, F. H. Shomburg and J. B. Barstolvus, 274 Cleveland Street.

The Plaza Metal Bed Co., 256 Maujer Street, Brooklyn, has increased its capital from \$7,000 to \$15,000.

The Gasoline Safety Corporation, New York, has been incorporated with a capital of \$100,000 by C. G. Davids, E. L. Ennis and G. P. Vanwyke, 253 Broadway, to manufacture safety specialties.

The Marf Machine Co., 17 Vandewater Street, New York, has increased its capital from \$10,000 to \$50,000.

The General Gauge Corporation, New York, has been incorporated with a capital of \$5,000 by G. W. Rollo and E. F. Hills, 7924 Ridge Boulevard, Brooklyn.

The Acorn Insulated Wire Co., 75 Richards Street, Brooklyn, has been incorporated with a capital of \$300,000 by F. and W. R. Prosser and W. George.

The Burr & Houston Co., Brooklyn, operating a foundry at 84 Calyer Street, has had plans prepared for an extension to its three-story plant.

The Warranted Instrument Co., New York, has been incorporated with a capital of \$10,000 by A. O. and W. A. Vanness, and O. M. Schmetz, 220 Broadway, to manufacture scientific instruments.

The Air Nitrates Corporation, 360 Madison Avenue, New York, is planning the construction of 24 buildings at its different plants; twelve, it is understood will be located at Toledo, Ohio.

The Ideal Tool & Machine Co., South Water Street, Poughkeepsie, N. Y., is considering the erection of a two-story addition, 25 x 40 ft., to cost \$20,000.

The New York, New Haven & Hartford Railroad, Grand Central Terminal, New York, has filed plans for a one-story brick addition, 43 x 200 ft., to its engine house at the East 132nd Street shops.

The United States Gas Defense Co., Long Island City, N. Y., has had plans prepared for extensions and improvements in its plant at Second and Jackson streets.

The Surgical Instrument Mfg. Co., Newark, N. J., has been incorporated with a capital of \$50,000 by P. C. Donner, Henry Otten and C. E. Francke.

The Oxweld Acetylene Co., 640 Frelinghuysen Avenue,

Newark, N. J., has awarded contract to Frederick Kilgus, Inc., 13 South Sixth Street, for a three-story addition, 42 x 108 ft.

Young & Co., Troy, N. Y., has been incorporated with a capital of \$5,000 by A. M. and H. E. Young and J. W. Whinnets, Troy, to manufacture sheet-metal goods.

Buffalo

BUFFALO, Sept. 30.

The Metal & Alloy Specialty Co., 25 Illinois Street, Buffalo, has applied for a building permit for a new foundry on Marion Avenue, for the production of brass, aluminum and other castings.

The United States Drawn Steel Co., Fidelity Building, Buffalo, has awarded contract to the J. W. Cowper Co., Fidelity Building, for a new plant.

The Yates Adjustable Crutch Co., Buffalo, has been incorporated with a capital of \$25,000 by C. W. Pooley, L. T. Nemo and C. E. Domont, Iroquois Building, Buffalo.

The Acme Pattern & Machine Co., 1553 Niagara Street, Buffalo, has filed plans for a one-story extension, 20 x 32 ft.

The Aluminum Castings Co., 1850 Elmwood Avenue, Buffalo, has awarded contract to the Schaaf Co., Mutual Life Building, for a one-story trimming works, 80 x 160 ft., at its Elmwood plant.

The Buffalo Apparatus Co., Buffalo, has been incorporated with a capital of \$50,000 by I. B. and R. H. Hempleton and F. B. Turnbull, 466 West Ferry Street, to manufacture chemical equipment.

Francis G. Crone, Buffalo, has received permit to remodel the building at 279 West Ferry Street for a shop for the manufacture of machine parts.

Ogden R. Adams & Co., 159 St. Paul Street, Rochester, N. Y., manufacturers of metal-working machinery, are having plans prepared for extensions in their two-story works, 45 x 60 ft., to cost \$4,000.

The Manufacturers' Tool & Die Co., Rochester, N. Y., has been incorporated with a capital of \$30,000 by C. B. Williams, M. Cerf and A. Beck.

The Eastman Kodak Co., Rochester, N. Y., has completed plans for the proposed four-story addition to its plant.

The American Car & Foundry Co., Metcalfe Street, Buffalo, is enlarging its foundry.

The Monarch Knitting Co., Inc., Rustic St. and the Erie Railroad, Buffalo, is erecting a boiler and power house 39 x 54 ft.

The Pullman Co., Broadway and New York Central Railroad, Buffalo, is enlarging its engine house at a cost of \$16,000.

The city of Geneva, N. Y., J. W. Brennan, city engineer, has awarded contract for the erection of a boiler house, 40 x 48 ft., to cost \$7,500.

New England

BOSTON, Sept. 30.

Large business from outside of New England and almost no business from inside its bounds continues to be the story of the New England machine tool trade. The local conversion committees are getting busy, and it is anticipated that some call for machinery and tools will result from the effort of the less essential industries to take up essential war production. The continuing restrictions placed upon less essential industries will bring into the market many concerns that had felt that they would be able to continue in their own lines, even if output was cut in half or less. The educational work of the United States Employment Service is bringing about a better understanding of the need of men for essential industries, and this is promoting the work of the Resources and Conversion section of the War Industries Board in changing the character of the production in many plants.

Virtually no building or incorporation of new manufacturing organizations is going on in this territory, and this condition promises to continue for the duration of the war. Munitions plants are being permitted to make necessary small additions, but idle plants are beginning to be found here and there where non-essentials were produced, and it is thought probable that these plants will be utilized as far as possible instead of putting up new structures for essential industries.

The labor shortage is acute, and Government campaigns looking to the dilution of labor and to the shifting about of man power to better advantage are under way in Connecticut. A considerable amount of success has attended these efforts, and it is expected that this work will be under-

taken in most of the industrial centers before many weeks to help solve the labor problem.

The Nicholson File Co., Providence, R. I., is to build an addition, 22 x 49 and 25 x 31 ft., one story.

The Bridgeport Brass Co., Bridgeport, Conn., has awarded to the Schwarz Brothers Co. a contract for an addition, 60 x 67 ft., one story.

The Boston Pencil Pointer Co., Newton, Mass., has awarded to Rand & Dicks, Waltham, a contract for an addition, 60 x 120 ft., one story.

The New Bedford Dry Docks Co., Stonington, Conn., has been incorporated with authorized capital stock of \$200,000 by Mark L. Gilbert, Mystic; Louis Lubchansky, New London, and Frank H. Meader, Stonington.

Philadelphia

PHILADELPHIA, Sept. 30

William & Harvey Rowland, Inc., Tacony and Lewis streets, Philadelphia, manufacturer of springs, etc., has filed plans for a one-story concrete and steel addition, 48 x 76 ft., to cost \$25,000. Irwin & Leighton, 126 North Twelfth Street, are the building contractors.

The Schwarz Wheel Co., Trenton and Margaret streets, Philadelphia, has broken ground for a one-story addition to its power plant, 28 x 80 ft., to cost \$12,000.

The Universal Truck Hoist Co., Philadelphia, has been incorporated with a capital of \$200,000 by F. R. Hansell, Land Title Building, Philadelphia; and S. C. Seymour, Camden, N. J.

The McFarland-Meade Co., Forty-sixth Street and Woodland Avenue, Philadelphia, manufacturer of metal windows, has filed plans for a one-story addition, 56 x 140 ft., to cost \$10,000.

The Midvale Steel & Ordnance Co., Widener Building, Philadelphia, is taking bids for a power house, 44 x 46 ft., to be used as a sub-station at its Nicetown gun plant, and for alterations in its pattern building.

The American Pulley Co., 4200 Wissahickon Avenue, Philadelphia, manufacturer of pulleys, etc., has filed plans for a one-story addition, 92 x 113 ft., with wing 30 x 92 ft., to cost \$6,000.

The Roberts Filter Mfg. Co., Sixth and Columbia streets, Philadelphia, has taken bids for a two-story brick addition, 64 x 94 ft.

The Central Auto Repair Shop, Philadelphia, has leased property at 1420 Vine Street, for a new repair works.

The Philadelphia & Reading Railroad Co., Reading Terminal, Philadelphia, has filed plans for two reinforced-concrete buildings at its shops, Tulip and Somerset streets, consisting of a one-story structure, 42 x 50 ft., with wing 37 x 43 ft., to cost \$36,000, and a one-story building, 17 x 37 ft. to cost \$10,000.

A one-story boiler plant addition, 22 x 37 ft., to cost \$5,000 will be constructed by the Superior Thread & Yarn Co., at its factory, Howard and Norris streets, Philadelphia.

Blair, Campbell & McLean, Philadelphia, have been incorporated in Delaware with a capital of \$500,000 by G. H. Elmore, J. C. Lawrence and others, to manufacture brass castings, copper specialties, etc.

The Ordnance Department, Philadelphia, is having plans prepared for the construction of a brick and steel case shop at the Frankford Arsenal. Plans are also being drawn for a new experimental shop at the Arsenal. The Department has awarded a contract to W. W. Anstine & Co., 1218 Filbert Street, for the construction of a two-story, reinforced-concrete carpenter shop, 59 x 244 ft., to cost, with machinery and equipment, about \$200,000.

The Tacony Ordnance Co., Milner and Bleigh streets, Philadelphia, has filed plans for a two-story addition, 45 x 48 ft., to cost \$7,000.

The Dodge Sales & Engineering Co., Philadelphia, manufacturer of transmission machinery, has leased the four-story and basement building at 815 Arch Street, with about 17,000 sq. ft. of floor space, for its local establishment.

The American Insulation Co., Roberts Avenue and Stokley Street, Philadelphia, has filed plans for a two-story and basement addition, 25 x 80 ft.

The Lambert & Todd Machine Co., Camden, N. J., manufacturer of machinery, has awarded contract to John S. Townsend, 9 North Front Street, for a one-story erecting shop, 60 x 100 ft., at the foot of Clinton Street, to cost \$15,000.

The new plate and angle shop to be erected by the New York Shipbuilding Co., Broadway and Fairview Street, Camden, N. J., to replace one recently destroyed by fire, will be one-story, 200 x 500 ft., and is estimated to cost \$100,000.

The Reeves Stove & Foundry Co., Camden, N. J., has filed plans for two one-story additions.

A new electric power service plant is being constructed at the Pusey & Jones shipbuilding plant at Gloucester City, N. J., to replace power heretofore furnished by the Public Service Electric Co. The installation will consist of a battery of 5 boilers with superheaters, fuel economizers, stokers and auxiliary equipment, and generating machinery. Substations will be located at the Pennsylvania, New Jersey and Middle yards.

The De Laval Steam Turbine Co., North Clinton Street, Trenton, N. J., has taken over the entire plant of the Howard Demountable Rim Co., on the main line of the Pennsylvania Railroad, under lease. The company is planning to remove its pattern shop and other departments to the Howard plant, providing additional space at the present works for its machine shop and allied departments.

The Wyoming Shovel Co., Wyoming, Pa., manufacturer of shovels, has had plans prepared for a one-story addition, 75 x 100 ft., to cost \$25,000.

The plant of the Merchant Shipbuilding Corporation, Bristol, Pa., now consists of 12 berths which can accommodate 9000-ton ship hulls. Its contract with the Emergency Fleet Corporation calls for 60 vessels of 528,000 aggregate tonnage. It is expected to complete 16 8800-ton cargo carriers by Jan. 1. About 13,000 men are now employed.

The International Fabricating Co., 99 John Street, New York, is having plans prepared for the construction of a plant at Forty Fort, Luzerne County, Pa. The main building will be two-story, brick and concrete, 51 x 160 ft., with adjoining one-story, brick and steel structure, 80 x 160 ft., to be used as a machine shop. Ballinger & Perrot, Seventeenth and Arch streets, Philadelphia, are the architects.

The York Mfg. Co., York, Pa., manufacturer of refrigerating machinery, has started the erection of a one-story addition on North Hartley Street, to cost \$10,000.

The Harrisburg Rail Co., Harrisburg, Pa., has been incorporated with a nominal capital of \$5,000 by John E. Fox, A. G. Eden and John R. Geyer, to manufacture railroad rails, etc.

The Harrisburg Pipe & Pipe Bending Works, Harrisburg, Pa., has taken out a permit to build a two-story addition on Herr Street, to cost \$7,500.

The War Department, Washington, has authorized the construction of a new electric power plant at the works of the Milton Mfg. Co., Milton, Pa., for plant operations. It will have an initial capacity of 4000 kw., and is estimated to cost \$350,000.

The North American Motors Co., South Keim Street, Pottstown, Pa., has awarded contract to the Austin Co., 1312 Filbert Street, Philadelphia, for a one-story addition, 80 x 90 ft., to cost \$20,000.

The Lancaster Iron Co., Lancaster, Pa., is building a two-story addition, 40 x 80 ft.

The Lancaster Cork Works, Lancaster, Pa., has broken ground for two one-story additions, 60 x 215 ft. and 85 x 110 ft., to cost \$46,000.

The General Machine Works, Prospect and Lamour streets, York, Pa., has filed plans for an addition to cost \$14,000.

Baltimore

BALTIMORE, Sept. 30.

The shell production for the Government at the plant of the Kennedy Foundry Co., Charles and Wells streets, Baltimore, will be devoted to semi-steel shells of 75-mm. and 155-mm., mustard gas type. The company is now enlarging its works for the new operations.

The Bureau of Yards and Docks, Navy Department, Washington, will build a power plant at Quantico, Va., to cost \$45,000.

Dudley Shoemaker, vice-president of the Poole Engineering & Machine Co., Woodberry, Md., denies press reports that the company will build extensive additions to the plant of the Maryland Pressed Steel Works, Hagerstown, Md., which is controlled by the company, for the purpose of manufacturing aeroplanes.

The Novelty Steam Boiler Works, 917 South Howard Street, Baltimore, has started the construction of an addition, 17 x 70 ft., to cost about \$3,000. It is in the market for second-hand I-beams, angles and channels.

J. Castberg, Park Avenue and Lexington Street, Baltimore, has applied for permission to install 15 hp. in motors.

An additional boiler plant at the Navy Yard, Washington, to cost about \$150,000, will be constructed by the Bureau of Yards and Docks.

The Hickory Foundry & Machine Co., Hickory, N. C., has been incorporated with a capital of \$25,000, by P. C. Sharp, T. W. Cherry and others to manufacture castings, machinery, etc.

The War Department, Washington, is planning the construction of a new repair shop for ordnance and other work at Camp Jackson, S. C., near Columbia, to cost about \$20,000.

The Acme Fishing Tool Co., Depot Street, Parkersburg, W. Va., has commenced the construction of a one-story forge shop addition to its plant, 30 x 70 ft.

The Forest City Machine Co., Savannah, Ga., is planning an addition to increase the capacity of its foundry and pattern shop at an estimated cost of about \$15,000.

The Wofford Shoals Light & Power Co., Cornelia, Ga., is arranging for a bond issue of \$50,000 for extensions in its electric power plant.

The Anderson Motor Co., Rock Hill, S. C., is planning for a one-story addition, 80 x 350 ft. A meeting has been called to increase the capital of the company to \$1,125,000 for expansion.

The Bruce Dry Dock Co., Pensacola, Fla., is planning to build a new drydock, with shop facilities, and install a motor driven pumping system to replace the present steam pumping equipment.

The Southern Pipe & Foundry Co., Birmingham, Ala., has increased its capital to \$100,000 to provide for extensions.

The Steward-Hilty Machine Co., First Avenue, Birmingham, Ala., is planning the installation of an engine lathe, gear-cutting machinery and other equipment. It recently increased its capital to \$30,000.

Chicago

CHICAGO, Sept. 30.

The Cribben & Sexton Co., Chicago, has just closed against a list of about 90 machine tools required for the tool room, test room and gage department of its new shell plant in this city. The company bought where it could obtain the quickest deliveries, delivery being of more importance than make. Wherever possible, tools were taken from stock, and as a result of these conditions the business was pretty well distributed. The company will utilize buildings that housed its stove works.

Inquiries have been better than fair in the past week, and where anything like prompt delivery can be made sales were quickly closed. Several sales were made as a result of long-distance calls from points as far east as Buffalo and Syracuse, the sellers being dealers who rebuild tools. Collections continue to lag; one cause of this is that subcontractors cannot collect from their principals, while the latter assert Government payments have been delayed by mechanical changes which have been ordered in the completed product. A somewhat similar situation developed at the outset of the war when foreign orders poured into this country. It is expected that new business will slow up in the next two or three weeks because of the concentration of business executives on the Fourth Liberty Loan campaign.

Many prospects are looming up in the St. Louis territory, which in part is served from Chicago. The Dorris Motor Car Co., already on Government work, is contemplating another contract, and is to buy miscellaneous machinery, and this is also true of the National Tool & Mfg. Co. The Laclede Gas Light Co. is putting up two buildings for shell work, for which machinery has been bought. The Western Cartridge Co., East Alton, Ill., is expected to purchase additional tools at an early date.

The list prepared by the Rock Island Arsenal has not yet been placed before the trade, the appropriation not yet being available. As in all lines of industry, the selection of men for the draft is receiving a great deal of attention from executives, and it is accompanied by anxiety lest employees considered essential be taken from their work.

Local business leaders associated with the Illinois Manufacturers' Association, Chicago, are working toward the formation of a \$50,000,000 corporation to build airplanes in this city. The subject has been taken up with Washington.

William P. Whitney, architect, 38 South Dearborn Street, Chicago, is preparing plans for a manufacturing plant at Clearing, Ill., which will include a machine shop, 100 x 210 ft., and a one-story foundry of multiple truss construction, with provision for a traveling crane in the future. The total cost will be \$96,000. The owner's name is not made public.

The Crane Co. continues its improvements at its Corwith plant. The Lanquist-Illsley Co., 1100 North Clark Street,

has been awarded the contract for another addition, a one-story nipple shop, 100 x 448 ft., to cost \$225,000.

The Edison Electric Appliance Co. will build a one-story factory, 100 x 146 ft., at 5660 West Taylor Street, Chicago, the general contract for which has been awarded to the W. A. Pillemer Co., 11 South La Salle Street, Chicago. The cost will be \$40,000.

The Chicago Nipple Mfg. Co., manufacturer of pipe nipples, 900 Lake Street, Chicago, has had plans made for remodeling for shop purposes a building, 130 x 210 ft., in Southport Avenue, near Cortland Street.

The Republic Box Co., 913 to 931 North Halsted Street, Chicago, has awarded the contract for the construction of a one-story addition, 20 x 56 ft., to be used as a saw-filing room.

The Lewis Institute, 1951 West Madison Street, Chicago, has been granted a permit for the construction of a one-story engineering laboratory, 95 x 126 ft. The institute is training young men in occupational work for the United States Army.

The Gardiner Metal Co., West Lake Street, Chicago, contemplates the erection of a new one and two-story plant, 40 x 220 ft. Plans have been drawn.

The Atchison, Topeka & Santa Fe Railroad, Chicago, will build a new electric power plant at Shopton, Iowa, to cost about \$75,000.

The Hall Mfg. Co., Monticello, Iowa, manufacturer of wire goods, has broken ground for a new one-story plant, 15 x 420 ft., to cost about \$75,000.

The Perfection Corn Planter Mfg. Co., Carroll, Iowa, will build a new one-story plant, including foundry, 60 x 150 ft.

The War Department has let contract to the Wimmer Construction Co., St. Louis, for additional buildings to be used by the Western Cartridge Co., Alton, Ill. The capacity of the plant is to be doubled and the amount of the contract is reported to be nearly \$2,500,000. The Bureau of Housing recently indicated its intention to spend about \$2,000,000 in improving the housing conditions for workmen at this plant.

Detroit

DETROIT, Sept. 30.

A heavy demand exists for machine tools, practically all for Government work. Grinders, lathes and milling machines are especially sought. Priorities have facilitated deliveries, which are better than they have been in months. One order of unusual size has been reported for a company converting its plant to munition work.

Automobile manufacturers are working on war orders almost entirely. The Hudson Motor Car Co., the Ford Motor Co. and the Packard Motor Car Co. are operating 100 per cent on Government orders. The Maxwell Motor Co., the Studebaker Corporation, the Paige-Detroit Motor Car Co., the Cadillac Motor Co., Dodge Brothers, the Liberty Motor Co., and the 120 accessory companies formerly supplying them with parts are averaging more than 75 per cent. Contracts placed in Detroit are conservatively estimated at \$900,000,000, of which more than half will be completed by the end of the year.

Inquiries on war contracts totaling \$50,000,000 have been received in Detroit from Government sources. Most of the work is for foundries, and it is probable that the greater part of the orders will be placed in this district.

The Kerr Machinery & Supply Co., Detroit, has changed its name to the Kerr Machinery Corporation. The personnel of the management will remain unchanged.

The Packard Motor Car Co., Detroit, has received a Government contract for 3000 class A motor trucks, standard White 1½-ton model.

The Detroit Twist Drill Co., Detroit, has let contracts for a three-story addition to its plant on West Fort Street.

The American Blower Co., Detroit, has let contracts for a one-story addition to its plant at Russell and Piquette streets.

The Kales Stamping Co., Detroit, will erect a two-story addition to its factory on Lafayette Boulevard.

The Reed Foundry & Machine Co., Kalamazoo, Mich., manufacturer of one-man tractors, is operating its foundry at about 75 per cent for the Government. It is making steel castings, hydraulic parts and iron working lathes.

The Bay City Foundry Co., Bay City, Mich., will erect a brick addition to cost \$30,000.

The Spencer-Smith Machine Co., Howell, Mich., is contemplating an addition to its plant to provide for Government orders which call for 98 per cent of its capacity in three months. In anticipation of a larger working force the housing problem is giving some concern.

Cleveland

CLEVELAND, Sept. 30.

A great deal of machine-tool business in orders and inquiries developed the past week. The Willys-Overland Co., Toledo, came into the market for a large amount of equipment, although no formal list was issued, which includes drilling and milling machines, boring mills, lathes and other machinery for work on 12-cylinder airplane motors. This company bought a few machines, and it is stated that its aggregate purchase will amount to around \$300,000. The American Brake Shoe & Foundry Co. placed orders for 30 milling machines, 20 screw machines and considerable other equipment for shell work at its Erie plant. It is understood that this company has sublet some of its contracts, so that its machinery requirements while heavy will not be as large as anticipated.

The Winton Co., Cleveland, which is planning to get on a 100 per cent war production basis, placed orders for considerable equipment for tripods for the large type of Browning machine guns, and is still in the market. The Doehler Die Castings Co. is buying considerable equipment for its Toledo plant for making airplane parts. The American Shipbuilding Co. has again come into the market for a number of machines. The Goodyear Tire & Rubber Co., Akron, will shortly require some additional machinery equipment. The Packard Motor Car Co., Detroit, placed an order for a round lot of machinery. It is understood that Henry Ford & Son will shortly begin buying equipment for their new Hamilton, Ohio, tractor plant. This business will be placed in Detroit. The inquiry from the Liberty Motor Co., Detroit, for 73 machines, including lathes, drilling and grinding machines, is still pending. The Eastern Production Co., Detroit, placed an order with a local machinery house for a 42-in. vertical boring mill.

Cleveland manufacturers are figuring on Government orders for recoil cases for Davis guns for the navy and have tentative inquiries out for machinery requirements. Orders are pending for 40,000 axles for type B army trucks, and the placing of these will probably result in additional machinery requirements. The American Can Co. has purchased 20 screw machines for its Toledo plant, and a local builder also took an order for 10 screw machines for the Steel Products Co., Cleveland. Syracuse, N. Y., manufacturers were heavy buyers of screw machinery the past week. Among orders placed were 12 for the New Process Gear Co., 20 for the Eclipse Machine Co., 9 for the Week-Hoffmann Co. and 3 for the H. H. Franklin Mfg. Co.

The Massillon Steel Castings Co., Massillon, Ohio, is extending its plant, adding 50 per cent to its foundry floor space and doubling its sand-blasting equipment. A standard 42-in. sand blast barrel furnished by the American Foundry Equipment Co., will be installed, and the company is putting in a new oil-fired car type of annealing furnace. A steam boiler plant will be provided for heating the foundry. The company recently increased its capital stock from \$250,000 to \$500,000.

The American National Co., Toledo, Ohio, has taken a large Government order for machine gun mounts, which it is stated will keep the plant operating at capacity for 5 or 6 months.

The McNaul Boiler & Mfg. Co., Toledo, has purchased property near the plant which it is reported will be used for extensions. It is building boilers for the Emergency Fleet Corporation.

The McCarthy Drill & Tool Corporation, Toledo, has completed a new two-story factory. It manufactures drills, reamers and cutters.

Cincinnati

CINCINNATI, Oct. 1.

A large number of machine tools have been bought by the Government for the new plant of the National Cash Register Co., at Dayton, Ohio, which will be used for making pistols. Only about half the machines needed have been bought. Large lathes, planing and milling machines are very hard to get, and second-hand machines are sold almost as quickly as they are placed on the market. Cranes are also hard to get for anything like prompt shipment.

It is rumored that several breweries in this vicinity will offer their plants to the Government after Dec. 1 for use in turning out war munitions.

Portable electric drilling machine manufacturers have all the work in hand that they can handle. One local firm has recently booked a Government order for approximately \$25,000 worth of these machines.

The growing importance of South America as a market

for machine tools and other machinery is illustrated by visits to Cincinnati of representatives of different countries in the southern half of the Western Hemisphere. Last week commissioners representing the Chilean Government visited a number of machine tool plants here and it is understood that considerable business is under negotiation with a number of firms.

The Burton Engineering & Machinery Co., Inc., Cincinnati, has purchased the plant of the Bahmann Iron Works Co., at Spring Grove Avenue and Alabama Street, and will fit it up for the manufacture of heavy-duty engine lathes. Later smaller machine tools will be made. The company is in the market for a large planing machine, ranging from 42 x 42 in. to 56 x 56 in. with a 34-ft. bed, also shaping machines and a large milling machine. The officers are as follows: R. C. Burton, president and treasurer; W. L. Sweet, vice-president and general manager, and Robert L. McCabe, secretary.

The Wapakoneta Machine Co., Wapakoneta, Ohio, has commenced construction on an addition to its hardening and tempering department, 50 x 89 ft., one story.

The Edwards Mfg. Co., Cincinnati, is in the market for one large and one medium sized back-gearied milling machine.

The L. Eid Concrete Steel Co., Cincinnati, has been awarded contract for an addition to the power plant of the Huenefeld Co., on Spring Grove Avenue.

The G. A. Schaacht Motor Car Co., Cincinnati, has awarded contract for an assembling building.

It is currently reported that the assembling plant of the Ford Motor Car Co., on Lincoln Avenue, Cincinnati, will be used by the Government in making war supplies.

The Neil-Smith Electric Tool Co., Cincinnati, has leased a building at 815 Broadway and will remove its plant from its present location on Sixth Street. It expects to double its present output of electric drilling and grinding machines as soon as the new quarters are occupied. John W. Neil is president.

The Cincinnati Shaper Co., Cincinnati, will erect a combination office and welfare building. Space occupied by its present offices will be used for manufacturing purposes. P. G. March is president.

The Liebel-Flarsheim Co., Cincinnati, maker of X-ray apparatus, has leased a building at 410 Home Street, and will remove from its present location in Coryville. The new building will have sufficient floor space to enable the company to double its present capacity.

The Groves Fertilizing Co., Cincinnati, will make a large addition to its plant in Lockland suburb. No information is obtainable as to the extra equipment that will be required.

The Lunkenheimer Co., Cincinnati, has let contract for an addition to its plant that will be used as a welfare building for its employees.

The Cincinnati Planer Co., Cincinnati, has let contract for an addition to its plant in Oakley, 50 x 150 ft., of sawtooth roof construction.

Work is progressing rapidly on the new plant of the Trailmobile Company's plant in Oakley. The company has a Government contract.

The Black & Clawson Co., Hamilton, Ohio, is making an addition to its plant that will be used for Government work. It has recently purchased five Shepard electric cranes for the new addition.

The Superior Gas Engine Co., Springfield, Ohio, has plans under way for enlarging its plant.

Plans have been approved for rehabilitating the shops of the Baltimore & Ohio Railroad, at Zanesville, Ohio. J. R. McCann is superintendent at Zanesville.

The daily press reports that the plant of the Ohio Gate Co., West Jefferson, Ohio, has been purchased by the Rowe Mfg. Co., Galesburg, Ill., and that it will be removed to Galesburg.

The Central South

LOUISVILLE, Sept. 30.

One of the largest Government contracts placed in Louisville for some time has been awarded to the Henry Vogt Machine Co., for approximately \$100,000 worth of refrigerating machinery for use in the Bush Terminal in Brooklyn, N. Y.

The Independent Brass Foundry, Louisville, recently secured some excellent copper and brass contracts for indirect Government orders.

The Louisville Henderson & St. Louis Railroad Co., Louisville, will rebuild a \$10,000 coal tippie at Henderson, Ky., which was burned last week.

The Hazard Coal Co., Hazard, Ky., plans rebuilding its power plant which was destroyed by fire.

The West Virginia & Kentucky Coal Co., operating on Smoot Creek, Letcher County, Ky., will build a power plant and install electrical equipment for furnishing light in homes and streets of its mining town.

Considerable damage was done by fire to the dry blast tower and engine room of the Chattanooga Iron & Coal Co., Chattanooga, Tenn.

Reports from Knoxville, Tenn., state that the fire loss at the plant of the William J. Oliver Mfg. Co., which was working on shell contracts, will run to \$40,000. Very little time was lost as a result of the blaze.

War-time activity at the plant of the Casey-Hedges Co., Chattanooga, Tenn., includes the production of boilers, cast-iron pipe and fittings for a variety of Government work. Contracts in hand cover boilers for the picric acid plants at Brunswick, Ga., and Little Rock, Ark., the steam plant at the Hog Island shipyard, various powder bag loading plants along the Atlantic Coast, 1000-hp. units for the gun-proving grounds at Scituate, Mass., and Government sawmills in Wisconsin. Its deliveries to the Emergency Fleet Corporation this year now total 50 boilers of 3500 hp. each; to the Muscle Shoals nitrate plant, 18 of 6000 hp. each, and to the American Expeditionary Forces, 18 of 4500 hp. each, for the base refrigerating plant.

The Cotton Belt Lumber Co., Bearden, Ark., is planning for the construction of a new boiler plant, to include a battery of four boilers with auxiliary equipment.

The Corley Mfg. Co., Chattanooga, Tenn., recently incorporated with a capital of \$37,500, contemplates the establishment of a plant for the manufacture of drop forgings, etc. A machine shop will also be operated.

Indianapolis

INDIANAPOLIS, Sept. 30.

Recent Government contracts awarded to Indiana manufacturers are: Hercules Gas Engine Co., Evansville, gasoline and kerosene engines; Evansville Tool Works, hatchets; Chandler & Taylor, Indianapolis, side crank engines; Liberty Car & Equipment Co., Hammond, gondola cars; E. C. Atkins & Co., Indianapolis, crosscut and hack saw blades and handles; Marsh Mfg. Co., Vincennes, wood tamping bars; Barker Car Co., Michigan City, gondola cars; Indiana Lumber & Mfg. Co., intrenching boxes; Superior Machine Tool Co., Kokomo, sockets and chucks; Wheeler-Schebler Carburetor Co., Indianapolis, carburetors; George H. Bishop & Co., Lawrenceburg, meat saws.

The Canton Glass Co., Marion, Ind., has increased its capital stock from \$112,000 to \$130,000.

The Ace Tractor Co., Hammond, Ind., has been incorporated with \$100,000 capital stock to manufacture tractors. The directors are Frank E. Gossett, Max Salmon and Henry Whitaker.

The Indiana Veneer & Package Co., Paoli, Ind., has been incorporated with \$30,000 capital stock to manufacture veneer products. The directors are Leroy E. Kirkpatrick, Horace Allerdice and Fred McCallister.

The additions to the Arcade file plant, part of the Nicholson File Co., Anderson, Ind., will cost about \$80,000.

The Pittsburgh Model Engine Co., Peru, Ind., is building two one-story additions to its plant, 40 x 240 ft. and 30 x 180 ft., to cost \$100,000. Headquarters are at Pittsburgh, Pa.

Milwaukee

MILWAUKEE, Sept. 30.

The last week of the month brought a rush of new business to local machine-tool manufacturers and balanced the slackening of orders of the previous week to the extent of making the month one of the best of the year. A Toledo, Ohio, interest engaged in the manufacture of 8 and 12-cylinder aviation engines placed two orders, aggregating nearly 60 milling machines of the Nos. 2 and 3 types, with a local maker. Most of the milling machine business in September came from the Central Western States and was for the larger sizes.

The labor situation is more favorable, although the problem of obtaining men and retaining existing forces is still predominant. The turnover, however, has been considerably lessened by the effect of Government control.

The Northwest Engineering Works, Green Bay, Wis., organized last June to take over the marine works of the

Hartmann-Greiling Co., for the construction of steel and wooden vessels, has been awarded a contract to build 21 ocean-going tugs, in addition to 13 previously ordered by the Government. The second contract, which involves \$4,500,000, will make it necessary to increase the working force from 300 to about 500. The company is constructing several hshop buildings and will add new berths. New equipment will be installed, contracts for most of which have been placed.

The Northern Foundry Co., Marinette, Wis., manufacturer of agricultural and automotive castings, has acquired the controlling interest in the Dost Pattern Co., Menominee, Mich., and will consolidate the plant with its own. As noted, the Northern company has purchased a building adjoining its plant and is converting part of it into a foundry addition. An extension is being erected to provide needed machine-shop facilities. The new pattern-shop will occupy the second floor of the extension. Bruno E. Dost, chief owner of the Menominee plant, will be superintendent of the pattern department.

The Kempsmith Mfg. Co., Milwaukee, manufacturer of milling machines, is making numerous improvements to increase the efficiency of its shops and power plant. A new automatic coal-handling plant, with a $\frac{3}{4}$ -ton bucket, 200-ton bins, and automatic stokers, is being installed. A new storage house is under construction and considerable space thus will be released for machine shop, assembling and finishing.

The Leatham D. Smith Shipbuilding Co., Sturgeon Bay, Wis., which recently was awarded a Government contract to build three tugs, has received an additional contract for nine tugs as the result of the progress made on the original order. All of the vessels will be 100 ft. long and have wooden hulls. The yards are being enlarged so that five keels may be laid at one time. The two contracts are valued at more than \$2,000,000. Leatham D. Smith is president and general manager.

The Hamilton-Beach Mfg. Co., Racine, Wis., manufacturer of small electric motors and motor-driven industrial and domestic appliances and devices, is concluding negotiations with the Government for a large contract for war supplies, such as cartridge clips, fuses, and other metal goods which will require the entire capacity of the plant, recently enlarged. Fred J. Osius is president and general manager.

The Allen-Bradley Co., Greenfield Avenue and Clinton Street, Milwaukee, manufacturer of electric controlling apparatus, will build a \$35,000 addition to its plant, 65 x 90 ft., one story, of reinforced concrete, steel and brick. The architect is Alex C. Eschweiler, Goldsmith Building.

The Doble Heating System, Inc., Madison, Wis., has been incorporated with a capital stock of \$25,000 to manufacture kerosene automatic heating systems. The incorporators are William S. Cargill, Albert E. Smith, and James H. Ramsey.

Henry R. Sieverkropp, Racine, Wis., has developed an improved type of gasoline engine for aircraft, and has opened a small machine-shop to construct a 500-hp. engine for Government tests.

The Macomber & Whyte Rope Co., Kenosha, Wis., manufacturer of wire rope and cable, is building an extension to its wire mill and galvanizing plant and installing new machinery to handle Government contracts.

St. Louis

ST. LOUIS, Sept. 30.

Plans are understood to be in contemplation for the conversion of the Edwardsville, Ill., plant of the United States Radiator Corporation into a munitions plant.

The Christopher & Simpson Architectural Iron Works, St. Louis, has acquired a 36-acre tract for a new plant to which the present one will be moved.

The Philip Gruner Brothers Lumber Co., St. Louis, Mo., will equip a new yard and will require an electrically operated derrick, locomotive crane and other machinery.

Monroe, La., will equip a garbage reduction plant and is in the market for \$16,000 worth of machinery.

Frank J. Duffy, Natchez, Miss., and G. A. Vaught, Roxie, Miss., will equip a cotton gin and compress at Roxie.

The Johnson Iron Works, New Orleans, La., will equip angle, frame and boiler shops and install new machinery.

New Orleans, La., has plans for the equipment of a garbage reduction plant to cost \$1,100,000. W. J. Hardee, city engineer, is in charge.

The Sanitary Measuring Faucet Co., Oklahoma City, Okla., will equip a plant for the manufacture of a patented faucet to cost complete about \$100,000. A. Ballard, R. H. Locke and others are interested.

Oklmulgee, Okla., will improve its waterworks plant, adding four 1,000,000 gal. units in its filter plant, one 3,500,000 gal. direct acting, triple expansion pumping engine, two boiler feed pumps, two 150-hp. water tube boilers, one 100-kva. engine driven generating set and other machinery. Burns & McDonnell, Interstate Building, Kansas City, Mo., are engineers in charge.

The Tulsa Coal Mining & Contracting Co., Tulsa, Okla., is in the market for drag line scrapers, derricks, steam shovels and other equipment.

The Pan Electric Mfg. Co., St. Louis, will build a factory for the manufacture of electric motors and supplies at 4092 Bingham Street. It is in the market for a traveling crane, all other machinery having been bought.

The St. Louis Ventilating & Sheet Metal Co., St. Louis, has increased its capital stock from \$3,000 to \$5,000.

The Goldberg Plumbers Supply Co., 1117 Chestnut Street, St. Louis, will build a plant 45 x 109 ft. to cost \$20,000.

The Manson Mercantile Gin Co., Manson, Ark., is in the market for about \$16,000 worth of cotton ginning machinery and power-plant equipment. W. T. Holland is interested.

The Simmons Gin Co., Davidson, Okla., is in the market for \$15,000 worth of cotton ginning equipment to replace that destroyed by fire.

The Poteau Window & Dry Plate Glass Co., Poteau, Okla., will equip a plant to cost \$100,000 and is in the market for power plant and other machinery.

The Terminal Railroad Association, St. Louis, Mo., will erect an engine terminal with mechanical coal-loading devices, etc., to cost about \$125,000.

Guthrie, Okla., has plans for the expenditure of \$250,000 for waterworks equipment, installing new pumps and other machinery.

Texas

AUSTIN, Sept. 28.

The Eastland Light & Power Co., Eastland, which has been incorporated with a capital stock of \$250,000, will build an electric light and power plant. The incorporators are W. B. Monson, P. A. Rogers and R. Van Campen.

The Magnolia Petroleum Co., Dallas, has purchased a tract of land with a deep-water front near Port Neches and will, it is reported, construct a large refinery. It is expected, however, that the building plans will not be started until after the war.

The Fort Worth & Denver City Railroad, Amarillo, plans to enlarge its roundhouse and to rebuild the coal chutes which were destroyed by fire some time ago.

The City council, Palestine, will purchase the waterworks plant of the Palestine Water Co. for \$130,000, which it will enlarge and improve.

The municipal electric light and waterworks plant at Granbury, recently destroyed by fire, will be rebuilt at a cost of about \$25,000.

The naval air station to be established by the Navy Department, Washington, D. C., at Galveston, Tex., will include nine hangars, repair shops for airplane work, construction buildings, etc., the total cost being estimated at about \$3,000,000. Lieut. L. B. Hyde, chief engineer air service, Galveston district, American National Insurance Building, Galveston, is in charge.

The Nocona Machine & Mfg. Co., Nocona, Tex., has been incorporated with a capital of \$10,000 to manufacture machinery. Frank Putnam, N. B. Parrack and A. K. Albert, Nocona, are the incorporators.

The Pacific Northwest

SEATTLE, Sept. 24.

Shipbuilding and other industries in this section are being materially slowed down on account of the continued and increasing labor shortage. It is estimated that Seattle war industries alone are short 5000 workmen. The railroads are clamoring for men, and coal mining in this section is threatened with complete paralysis if workers are not speedily obtained.

As a result of the labor shortage, labor-saving equipment of every possible device is being called into use, and the demand for this type of machinery is phenomenal.

Recent embargoes on shipments to the East, and building restrictions are causing a serious condition in the lumber situation. The plants are almost solely engaged in producing fir and spruce for airplane production and millions of feet of lumber are accumulating, for which there appears to be no market.

Portland shipyards have been offered contracts for eight or nine steel steamers, ranging from 3000 to 10,000 tons, for delivery after the war. The contracts are to be placed by Douglas Woodhams of Douglas Woodhams & Co., ship owners' agents, London, and are for the French, Italian and Norwegian governments.

The Universal Galvanizing Co., Portland, has been organized under the joint ownership of the Universal Nut-Lock Co. and D. E. Agnew, who has been operating a small plant of his own. A new building is being erected adjoining the Universal Nut-Lock Co.

W. J. Fannon, of the supply division of the Emergency Fleet Corporation at Portland, has called a meeting of local manufacturers in an effort to get them to manufacture brass and iron valves and steel flanges for the ships being built at Portland. Manufacturers have been reluctant to engage in this work because of the necessary changes in equipment and the lack of assurance of continued orders. It is now said the Emergency Fleet Corporation is ready to go to any reasonable lengths to have the work done in Portland and it is believed that it will be undertaken as a result of the meeting.

The Elliott Bay Shipbuilding Co., Seattle, has received Government contracts for five 3500 ton wooden freighters.

The Patterson-McDonald Shipbuilding Co., Seattle, plans the immediate construction of a heavy timbered forge shop, 40 x 60 ft., to cost about \$6,000.

The J. F. Duthie Shipyards, Seattle, has completed plans for a heavy-timbered punch and boiler shop, 93 x 269 ft.

John Wilson, shipbuilder, Seattle, has purchased the plant and five-acre tract of the National Steel Construction Co., Seattle, and will build steel tugs and ships up to 300 ft. in length, as well as manufacture crank shafts and other equipment. The plant is now engaged in construction of small boats.

The McDougall-Overmire Co., Portland, will establish a machine shop and factory for the manufacture of tanks, reservoirs, stacks, etc., at the east approach to the Hawthorne Bridge. The main building will be 70 x 256 ft., one story.

The Columbia Iron & Welding Works, Astoria, Ore., contemplates extensive enlargements to its plant and the installation of new machinery.

The Kiernan & Kern Shipyards, Portland, will immediately start work on additions to its plant. The company recently received a Government contract for six steamers.

The Oregon Boiler Works, 3493 Klickitat Avenue, Seattle, will construct a boiler shop, 54 x 80 ft., to cost \$7,000.

The Brinkley Supply Co., Seattle, has completed plans for its two-story foundry building, 60 x 70 ft., to be built at 651 Alaska Street.

The Brinkley Supply Co., 546 First Avenue, South, Seattle, plans the erection of a two-story frame foundry, 60 x 70 ft. New equipment will be installed.

The City Council, Bremerton, Wash., plans the construction of an electric light and power plant and system to cost about \$200,000.

The Pacific Marine Iron Works, Portland, will erect two additional buildings and install new equipment.

The Shattuck, Ny & Bickford Co., Inc., San Francisco, is erecting a new building at Clay and Battery streets for a display room and machine shop, the latter to have a floor space of about 6000 sq. ft. The present machine shop will be moved to the new location.

The C. L. Best Gas & Traction Co., San Francisco, has commenced the erection of an additional machine shop, 100 x 200 ft., at its plant in San Leandro. New machinery will be installed, and the output increased. At present the company is turning out two tractors per day.

The Victory Engine Co., Oakland, has been organized to build rotary engines designed by E. G. Gould, Oakland.

The San Joaquin Portland Cement Co., Porterville, Cal., will shortly be in the market for machinery for a plant it is preparing to erect.

Canada

TORONTO, Sept. 29.

There is a very brisk demand for high-speed and carbon tools, especially in the call for cutters and reamers. With additional orders for war material and munitions being placed in the Dominion by the United States Government the machine-tool industry, which had quieted down to a great extent, has now grown to such proportions that it is practically impossible for tool builders to supply the re-

quirements, in fact many Canadian manufacturers are so filled with regular business that special work in the way of shell machinery cannot be accepted. The Canada Cement Co., Montreal, and the P. Lyall Construction Co., which have large shell orders for the United States Government, are big factors in the demand for machine tools. The Leaside Munitions, Ltd., Leaside, Ont., which is building an addition to its plant, will shortly have the buildings completed and will be ready for the installation of machinery. There is also a noticeable demand for tools and equipment for the shipbuilding industry of the Dominion. The Halifax Shipyards, Ltd., Halifax, N. S., will require considerable machinery for its plant which is being erected at a cost of about \$4,000,000, while the St. John Shipbuilding Co., St. John, N. B., is also spending several millions of dollars.

Ker & Goodwin, Brantford, Ont., have received a contract from the United States Government for the construction of 175,000 semi-steel gas shells, to cost \$1,500,000. The company will commence at once on the erection of a new plant and will require considerable new machinery.

The Union Engine & Machine Works, Ltd., Montreal, has been incorporated with a capital stock of \$300,000 by Walter R. L. Shanks, Francis G. Bush, George R. Drennan and others to manufacture machinery, tools, engines, etc.

The Cedar Products, Ltd., Amherst, N. S., has been incorporated with a capital stock of \$500,000 by Frank L. Milner, Harry A. Purdy, and others to manufacture wood products, etc.

Grand Prairie, Alberta, will construct electric light plant to cost about \$40,000. R. L. Michaels is mayor.

The Canadian Salt Co., Sandwich Street, Windsor, Ont., will build a one-story boiler house at a cost of \$5,000. E. G. Henderson is superintendent.

The Lumber Products, Ltd., Brunette Street, New Westminster, B. C., will build an addition and install new machinery to cost \$120,000.

The William Lyall Shipbuilding Co., North Vancouver, B. C., will build an addition to its yards, and will also construct a wharf at a total cost of about \$100,000. W. S. D. Cook is manager.

T. McAvity & Sons, Ltd., 13 King Street, St. John, N. B., will build a one-story foundry to cost about \$50,000. Construction will commence immediately.

The Canada Metal Co., Fraser Avenue, Toronto, has started work on an addition to its factory to cost \$5,500.

The Hoffer Motor Boat Co., Georgia Street, Vancouver, B. C., is planning for the erection of an airplane factory to cost about \$100,000. H. F. Hoffer is manager.

The Columbia Block & Tool Co., foot of Smith Street, Vancouver, B. C., will build a steel foundry to cost \$60,000. A. Opsall is manager.

Excavation has been started for the erection of a three-story brick building for the Hamilton Steel & Iron Co., Harvey Lane, Hamilton, Ont., to cost \$25,000.

The Steel Co. of Canada, Hamilton, Ont., has started work on the erection of a new building to cost \$70,000.

The John Morrow Screw Co., Thames Street, Ingersoll, Ont., will build an addition to its plant and install new machinery at a cost of \$20,000.

The Thomas Pink Co., Ltd., Pembroke, Ont., whose plant was destroyed by fire, will commence at once the erection of a concrete and brick machine shop to cost \$25,000 and a garage to cost \$20,000.

The Dominion Forge & Stamping Co., Walkerville, Ont., is in the market for a guillotine type steel shears, for shearing up to 5-in. rounds. Hilles & Jones machine preferred.

The City council, Chatham, Ont., has signed an agreement with the Denby Motor Trucks Co. for the erection of a \$200,000 plant to be completed and in operation by next March. The city will give the company a 3-acre site and will make provisions for further land grants if needed within the next four years.

Sheldons, Ltd., Galt, Ont., manufacturer of machinery, blowing apparatus, etc., will build an addition to its plant to cost \$18,000. Plans are being prepared by J. H. Mickler, architect, Preston, Ont.

The Chesley Chair Co., Ltd., Chesley, Ont., is in the market for a 20 to 35 hp. motor, three-phase, 60-cycle, 220-volt; also a vacuum pump.

The Massey Harris Co., King Street West, Toronto, has taken out a permit for the erection of a factory to cost \$140,000.

The K. & S. Canadian Tire & Rubber Co., Ltd., Toronto, has been incorporated with a capital stock of \$1,000,000 by William H. Cook, John D. Murray, Gordon W. Homme and others to manufacture rubber tires, etc.

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